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DOCUMENTED BRIEFING

A Gap Analysis of Life Cycle Management Commands and Best Purchasing and Supply Management Organizations

Nancy Y. Moore • Mark Y. D. Wang • Carol E. Fan • Clifford A. Grammich

Prepared for the United States Army

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Preface

This document reviews the progress of the Army, particularly within Army Materiel Command and its Life Cycle Management Commands (LCMCs), in implementing best purchasing and supply management practices as recognized by research literature and innovative enterprises. Leading firms report these practices have helped them improve performance, reduce total costs, and limit operational risks.

The Army has made some progress toward implementing these practices in its own operations. In this document we review specific achievements of the LCMCs in implementing best purchasing and supply management practices and how their progress compares with that of leading commercial enterprises. We use a five-point scale to compare the Army with other organizations on purchasing activities and practices, identifying areas where the Army is making good progress, needs improvement, or should place a particular priority for improvement.

This work should be of interest to those tasked with responsibility for leading, managing, or executing practices, processes, and organizational structures to improve the outcomes and reduce the total costs of Department of Defense (DoD) purchasing and supply management activities.

This research has been conducted in RAND Arroyo Center's Military Logistics Program. RAND Arroyo Center, part of the RAND Corporation, is a federally funded research and development center sponsored by the United States Army. Questions and comments regarding the research are welcome and should be directed to the principal investigator, Nancy Moore, 310-451-6928 or nancy@rand.org.

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Summary

In recent years, the Army has faced several budgeting challenges. These have been posed by the need to transform how it fights, to continue operations in Iraq and Afghanistan while maintaining readiness for other contingencies, to regenerate and modernize its force, and to improve how it does business and integrates with others (e.g., coalition partners, other services, and suppliers).

Efforts to address any budgeting challenges must focus on the Army's purchases of weapons, goods, and services, which comprised 58 percent of the budget in fiscal year 2006. How the Army procures supplies and manages its external suppliers of goods and services is critical to improving support to the soldier and lowering total costs.

Innovative commercial enterprises are increasingly focused on managing their suppliers, supply base, and supply chains through emerging best purchasing and supply management (PSM) practices. These practices include rigorously analyzing spending, markets, and the supply base to develop enterprise-wide supply strategies linked to strategic goals for every major spending category. The resulting tailored supply strategies often lead to consolidating requirements and multiple contracts and partnerships with selected providers for improved quality and delivery as well as lower total costs.

Many best practices are applicable to the Army's mission and structure. Indeed, the Army has already taken steps to implement several such practices. This includes the writing of longer-term contracts, sharing demand forecasts with selected suppliers, and development of cross-functional supply teams. At the same time, current administrative processes and results, including long lead times that lead in turn to high inventory requirements, show that further improvements are possible.

To help it improve its implementation of best purchasing and supply management practices, the Army asked RAND Arroyo Center to compare the

implementation of these practices by the Army Materiel Command (AMC) to those of leading commercial enterprises. We then identify areas where AMC can expand its implementation of best purchasing and supply management practices.

To do this, we first reviewed and synthesized the academic and business literature on best purchasing and supply management practices, compiling a list of key characteristics, activities, and practices for each step in the evolution toward best practices. We then categorized what we found into four somewhat overlapping organizational dimensions: functional attributes, activities, practices, and time allocation. We placed each into one of five stages ranging from reactive tactical buying to world-class purchasing and supply management practices. Second, we analyzed Army contracting data on the number of contracts, suppliers, and contract length. Third, we interviewed selected leaders and personnel at each of the Army's Life Cycle Management Commands (LCMCs)—those for Aviation and Missiles (AMCOM), Communications-Electronics (CECOM), and Tank-automotive and Armaments (TACOM)—to gauge the implementation of best practices, judging these on a five-point scale. From this, we identified areas where AMC could improve its implementation of best practices.

Findings

Since the terrorist attacks of September 11, 2001 against the United States, and the subsequent Army actions in Afghanistan and Iraq, the number of contracts, dollars, and suppliers for the LCMCs has increased. Most contracts are still short-term (i.e., less than two years) and for relatively low values, with the LCMCs spending most of their time and resources on a small portion of their expenditures. Dollars per contract and supplier and contracts per supplier are approximately where they were in 2001 and previous years. Contracts per supplier are approximately the same across all LCMCs.

The average number of National Item Identification Numbers (NIINs) per contract is also relatively low, indicating that there may be opportunities to

increase the number of NIINs per contract and realize some contracting efficiencies as well as enable improved supplier management. These opportunities will vary; the average number of NIINs per contract and supplier, for example, is higher in CECOM than in the other two LCMCs.

In our interviews, we found that all three LCMCs are using some cross-functional teams to develop acquisition plans. Not all these teams are permanent; some come together only for specific procurements. These teams are organized primarily by weapon system, which limits opportunities for sourcing improvements across systems. The plans are seldom based on rigorous analyses of spend, suppliers, supply market, risks, or total costs, and instead are constrained in their scope by the time or resources personnel have to perform these analyses. Much of this time, of course, is constrained by the need to quickly establish a contract to meet a customer's required delivery date. The LCMCs are moving to longer-term contracts, but as our data showed, most contracts remain short-term ones.

LCMC leaders are placing a greater emphasis on education of their personnel, requiring degrees for new hires. A number of experienced personnel are also pursuing advanced degrees while they work. Leaders are also placing a greater emphasis on training. New hires are given extensive training during their first two years, and forty hours of annual training is required for all contracting personnel. Nevertheless, more experienced personnel have trouble finding the time or travel resources for their training or to provide mentoring to new hires.

The LCMCs have started to share requirements forecasts with key suppliers, although efforts to date have been limited to a few suppliers. In some cases, only repair-depot requirements, and not field-level demands, are shared. The LCMCs also provide monthly, and not "real-time," data to their suppliers. The LCMCs have or are planning to acquire a Logistics Modernization Program, but they have encountered challenges using this software.

The LCMCs also lack a comprehensive set of supplier performance metrics, including ones for delivery and quality, which are critical to good

supplier management. One LCMC does invite its top suppliers to a biannual meeting with the commanding general, focusing on supply chain issues and what suppliers and the LCMC can do to improve. LCMC personnel also report attending industry days such as those hosted by the Defense Logistics Agency.

Conclusions and Recommendations

Leading enterprises report reducing their total costs and improving supplier performance, including development, quality, and delivery of products, by implementing best purchasing and supply management practices. These include reorganizing and upgrading purchasing and supply management organizations and investing in personnel and technology. Because many best purchasing and supply management practices are synergistic, the greatest benefits are obtained when these practices are implemented enterprise-wide.

The Army and, especially, AMC could see many improvements through implementation of best purchasing and supply management practices. In particular, implementation of such practices is likely to reduce total weapon system and sustainment costs and to improve delivery and quality.

Overall, the LCMCs and AMC are making progress toward implementation of best purchasing and supply management practices. They have adopted most leading practices to some degree, but their implementation is not widespread. Some practices, such as sharing forecasts and meeting with suppliers, need to be implemented more broadly.

AMC has made good progress on personnel training and education as well as on moving to longer-term contracts. It lags in such areas as rigorous analysis of spend, markets, risks, and total costs associated with supply resource management. AMC and the LCMCs need to develop their own capabilities to analyze spend from the perspective of the LCMCs, the Army, and the Department of Defense as a whole.

AMC also needs to improve its supplier analyses and ensure that resources are available to properly measure and manage supplier performance and assess supply markets. Such efforts would benefit from the development of supplier

teams. If Army spending with a specific supplier is only at one LCMC, then that LCMC should lead the team, otherwise, team leadership should be with the LCMC with the most spend with the supplier or with AMC headquarters. Such teams should examine contract consolidation possibilities, particularly on sole-source contracts, development of supplier scorecards to assess performance, and possibilities for joint collaboration, planning, and forecasting.

Similarly, AMC should develop councils for its key category groups. These teams would aggregate competitive requirements across weapon systems, rationalize suppliers, and standardize categories wherever possible. Many suppliers and products are used across weapon systems, dictating the need for supplier or category teams that span weapon systems rather than the present purchasing focus by weapon systems.

Acknowledgments

We would like to thank our initial project sponsors at the U.S. Army Materiel Command: Robert Radin, then Deputy Chief of Staff, G-3, and Jeff Parsons, then Director of Contracting. We also thank our initial action officer, John LaFalce. We also thank our LCMC contacts for helping us arrange personnel interviews for this study, as well as the LCMC personnel who took time from their busy schedules to participate in our interviews. We would like to thank Lieutenant Colonel John Coombs for helping us track down a number of references. We thank Ellen Pint and Lisa Ellram for their reviews of this document and for their many helpful suggestions. Lastly, we would like to thank Donna Mead for formatting and managing the publication of this document.

Abbreviations

AMC	U.S. Army Materiel Command
AMCOM	U.S. Army Aviation and Missile Life Cycle Management Command
BRAC	base realignment and closure
CAR	Contract Action Report
CECOM	U.S. Army Communications-Electronics Life Cycle Management Command
CPFR	collaborative planning, forecasting, and replenishment
DCMA	Defense Contract Management Agency
DLA	Defense Logistics Agency
DLR	depot-level repairable
DoD	U.S. Department of Defense
EPI	Early Purchasing Involvement
ESI	Early Supplier Involvement
FOB	freight on board
FSC	Federal Supply Class
FY	fiscal year
LCMC	Life Cycle Management Command
LMP	Logistics Modernization Program
NIIN	National Item Identification Number
OEF	Operation Enduring Freedom
OIF	Operation Iraqi Freedom
PALT	procurement administrative lead time
PEO	Program Executive Office
PLT	production lead time
PPI	Producer Price Index

PPM	parts per million
PRON	Program Request Order Number
PSM	purchasing and supply management
SRM	supplier relationship management
TACOM	U.S. Army Tank-automotive and Armaments Life Cycle Management Command

1. Introduction



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Gaps in Purchasing and Supply Management Between Army Life-Cycle Management Commands and Best-Practice Organizations

Nancy Young Moore, Mark Wang, Carol Fan, and Clifford Grammich

The Army is seeking to provide improved support at a lower total cost. To do so it has launched a number of major improvement efforts drawn from the commercial sector, such as Lean Six Sigma, to improve its internal processes, including equipment maintenance and repair.

External suppliers provide the Army with its weapons, spare parts, installation support, some of its equipment maintenance and repair, and most of its other supplies such as food and fuel. Indeed, in fiscal year (FY) 2006,

58 percent of the Army's budget was for goods and services.¹ Consequently, how the Army procures supplies and manages its external suppliers is critical to improving support while lowering overall costs.

Innovative commercial enterprises are increasingly focused on managing their suppliers, supply base, and supply chains through emerging best purchasing and supply management (PSM) practices.² These practices include rigorously analyzing spending, markets, risks, and the supply base to develop enterprise-wide supply strategies linked to the enterprise's strategic goals for every major spending category. The resulting tailored supply strategies often lead to a consolidation of requirements and multiple contracts (particularly sole-source contracts with existing providers) and the selection of the best providers, who are offered longer contracts with broader scopes. Equally critical is the development of practices with selected strategic providers to improve quality and delivery and reduce total supply chain costs. Such PSM practices have helped leading enterprises improve performance, reduce supply chain costs, and limit supply risks. Given the Army's mission and structure, such supply strategies must also incorporate organic depot repair capabilities and contingency planning.

Implementing best PSM practices has an impact on virtually every aspect of an enterprise, including its organizational structure, business processes, personnel skill profiles, training, and information systems. As such, it often represents a major transformation and has taken most leading companies three

¹ Source: OUSD (Comptroller), *National Defense Budget Estimates for FY 2008*, April 2007, Table 6-16. Civilian personnel (part of total personnel) was extrapolated by multiplying Army share of DoD civilian personnel (Table 7-5) by total DoD civilian personnel spend (Table 6-2). Data are constant fiscal year 2007 dollars. http://www.dod.mil/comptroller/defbudget/fy2008/fy2008_greenbook.pdf.

² Prominent examples include John Deere, Cessna, and Proctor and Gamble, all of which won the Medal of Excellence from *Purchasing* magazine. See Smock (2001), Avery (2003), and Teague (2008).

to five years to initially implement. Because PSM is an ongoing process, these companies have continued to improve their practices and processes beyond initial implementation and continue to reap new benefits.

This report assesses Army Materiel Command (AMC) implementation of best PSM practices. It identifies areas where AMC can expand its implementation of best PSM practices in the Life Cycle Management Commands (LCMCs): the Aviation and Missile Command (AMCOM), the Communications-Electronics Command (CECOM), and the Tank-automotive and Armaments Command (TACOM).

The Army Is Facing Significant Challenges

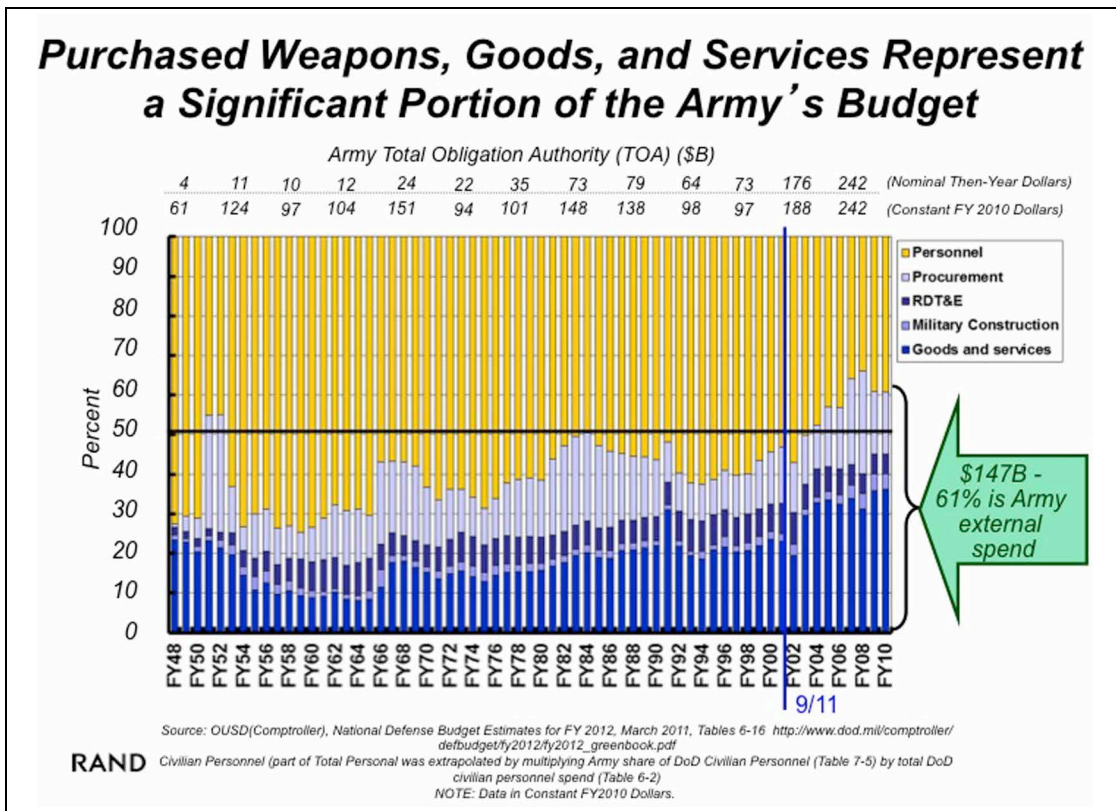
- **Transform how it**
 - **Fights**
 - **Does business**
 - **Integrates**
- **Modernize forces**
- **Continue to fight in Iraq and Afghanistan**
- **Maintain readiness for other contingencies**
- **Regenerate the force**



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The Army faces a number of significant challenges, including transforming how it fights, does business, and integrates with others (e.g., coalition partners, other services, and suppliers); modernizing its forces; supporting expeditionary operations overseas; maintaining readiness for other contingencies; and regenerating the force. PSM can help the Army meet its challenges by making the most of existing resources.



Analysis of the Army's Total Obligation Authority (TOA) over the past six decades reveals a pattern of increasing relative spending on goods and services. Weapon system procurement and purchased goods and services represented more than half (61 percent or \$147 billion of the Army's FY 2010 budget of \$242 billion.³ Nearly half this amount (more than \$77 billion or 55

³ The \$147 billion includes \$140 billion in contract actions of at least \$3,000, almost \$4 billion in government purchase card transactions, and about \$4 billion in intergovernmental transactions (e.g., Defense Logistics Agency, U.S. Transportation Command, Defense Finance and Accounting Service, etc.). Sources: OUSD (Comptroller), *National Defense Budget Estimates for FY 2012*, March 2011, Table 6-16, http://www.dod.mil/comptroller/defbudget/fy2012/fy2012_greenbook.pdf. See also https://www.fpbs.gov/fpbsng_cms/index.php/archives. See also Daniel J. Schwemmer on Army FY 2010 purchase card spend, email to author, January 25, 2012.

percent) was AMC contract spending for weapons, repair parts, maintenance, repair, and overhaul services. Thus, efforts to improve Army performance and reduce or control its costs need to address how the Army buys weapons, goods, and services.

Current AMC Process Performance Drives Relatively Large Inventory Investments

Process	Metric	AMC ¹
	Administrative Lead Time, months	3.3
	Production Lead Time, months	9.0
	Order Quantity, months	10.3
Results	Stock Availability %	84
	Not Mission Capable Supply %	80
	Facing Fill %	54
	Inventory Turns	0.5
	Days of Supply	716
	Inflation Rate %	5.2 ²
	Cost of Sales %	18.8

¹Process metrics do not include CECOM

²Inflation rate and weighted PPI of top key class IX FSCs

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The table above shows FY 2006 AMC⁴ performance metrics for key weapon system support processes and results. Although some of these metrics have been improving, there is room for still more improvement. For example, for top Class IX Federal Supply Classes (FSCs),⁵ the AMC cost inflation rate of

⁴ Because CECOM uses the Logistics Modernization Program (LMP), we were unable to include its performance in these metrics.

⁵ The FSCs used in the calculation of this number were 5820: Radio & TV Comm Equip, Exc Airborne; 5855: Night Vision Equip, Emitted and Reflected; 1005: Guns, through 30mm; 1615: Helicopter Rotor Blades, Drive Mechanisms and Components; 2840: Gas Turbines & Jet Engines, Aircraft, Prime Moving, and Components; 1560: Airframe Structural Components; 2815: Diesel Engines and Components; 2520: Vehicular Power Transmissions; 2530: Veh Brake, Steering, Axle, Wheel, Track; and 2610: Tires and Tubes, Steering, Axle, Wheel, Track. PPI inflation rates were calculated from the PPI series of the Bureau of Labor Statistics based on the North American Industry Classification System (NAICS), and annual average Army inflation rates were calculated from the National Stock

5.2 percent is much higher than the aggregate weighted Producer Price Index (PPI) for those goods, which was 0.9 percent. Its performance in comparison to that of the service parts division of a leading automotive company is also noteworthy. The automotive company's performance metrics included

- Procurement administrative lead time (PALT) = 0 months
- Production lead time (PLT)= 1.2 months
- Order quantities = daily market demand
- Stock availability = 98 percent
- Facing fill = 95 percent
- Inventory turns = 6.9
- Days of supply = 52.6
- Cost of sales = 11 percent.⁶

Although AMC is unlikely to match best commercial performance because of its unique mission and statutory requirements, if it can move closer to commercial performance, then it can substantially improve support to the warfighter and reduce total inventory costs. It has been moving in this direction, albeit at a slower pace than some may like.

Number Master Data Record (NSNMDR) Sector 1001, historical data for the period of 1995–2005. Source: unpublished RAND analysis.

⁶ Data from RAND communications and meetings with a leading automotive company.

Army Materiel Command PSM Efforts

- **Life Cycle Management Commands (LCMCs) have been implementing some best PSM practices**
 - **Longer-term contracts**
 - **Sharing forecasts with selected suppliers**
 - **Cross-functional supply strategy development teams**
 - **Proactive sourcing**
- **Army Materiel Command (AMC) launched an initiative to improve its PSM in 2006**
 - **Plans to launch one or more PSM pilots**
 - **Hired IBM to help AMCOM develop an implementation plan**
- **RAND tasked to identify gaps between world-class and current LCMC PSM implementation**

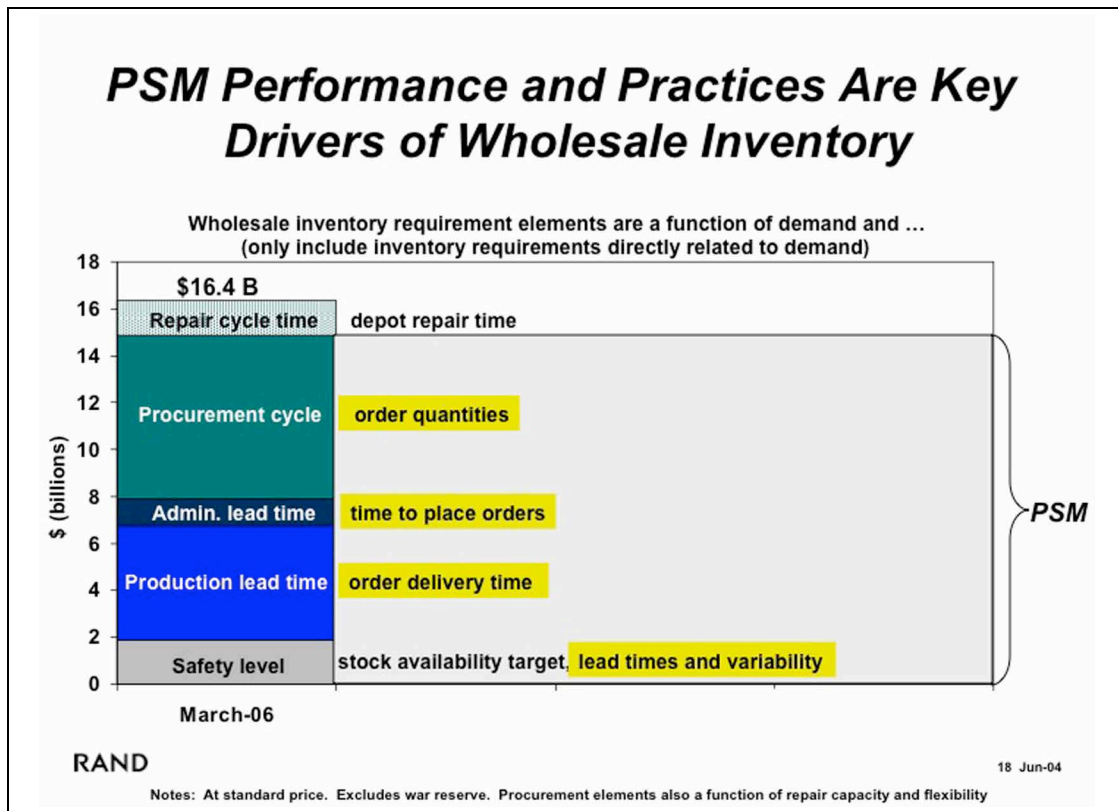
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The LCMCs have been working toward implementing a number of best PSM practices. These efforts include writing more long-term contracts with key suppliers through strategic sourcing efforts; implementing performance-based logistics agreements; sharing forecasts with selected suppliers through collaborative planning, forecasting, and replenishment; using cross-functional acquisition strategy development teams; and doing proactive sourcing (i.e., establishing more flexible supply arrangements in anticipation of demand).⁷ In

⁷ On federal mandates for strategic sourcing, see Johnson (2005). On performance-based logistics (PBL), see DoD Instruction 500.02, which states, “PBL offers the best strategic approach for delivering required life cycle readiness, reliability, and ownership costs. Sources of support may be organic, commercial, or a combination, with the primary focus optimizing customer support, weapon system availability, and reduced ownership costs.” On collaborative planning, forecasting, and replenishment and other TACOM ebusiness efforts, see Pat Dempsey-Klott, “CPFR at TACOM,” briefing, March 9, 2012.

2006, AMC launched an initiative to improve its PSM and hired IBM to help AMCOM develop a PSM implementation plan. The plan was to document AMCOM processes and share with other LCMCs, to develop a PSM implementation plan, and to launch one or more PSM pilots. At the same time, RAND Arroyo Center was tasked to identify any gaps between world-class and current AMC PSM implementation. Because these efforts were conducted in parallel, evaluation of the AMCOM effort was beyond the scope of this project. Indeed, demands on AMCOM staff significantly postponed their availability for interviews with us.

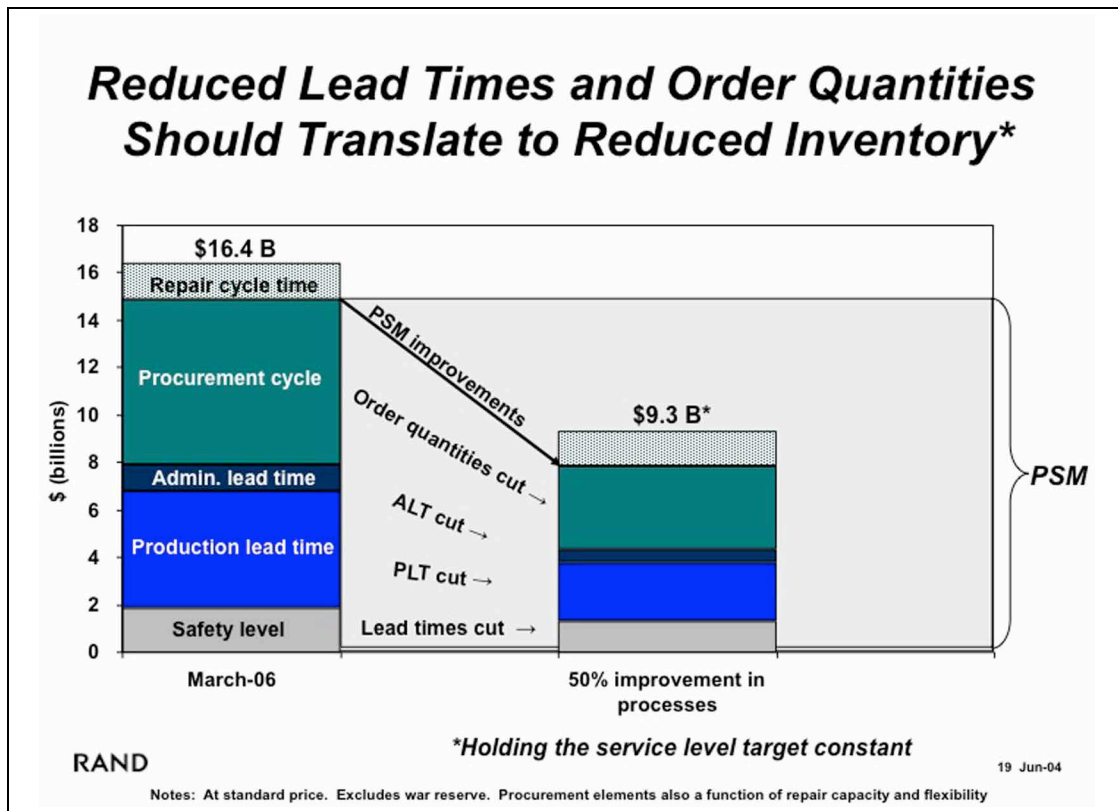


A decomposition of Army wholesale inventory requirements offers an example of how PSM practices and performance, in addition to demand, drive requirement. This graph shows Army wholesale inventory in March 2006.⁸ It shows inventory by components.⁹ Starting at the bottom of the left-hand column, the safety level is driven by stock availability targets as well as lead times and their variability. The production lead time (PLT) component of inventory is driven by the order-to-delivery time. The procurement administrative lead time (PALT) portion is driven by the time it takes to place an order, which can include the time it takes from requirement identification to the execution of a contract if no contract is in place, or the time to place an

⁸ This snapshot uses standard prices and excludes war reserve.

⁹ Procurement elements are also a function of repair capacity and flexibility.

order on an existing contract. The procurement cycle component is driven by order quantities. That is, if order quantities are large relative to demand, the procurement cycle component will be large. PSM practices and performance affect order quantities, the time to place an order, the order delivery time, and lead times and variability. Hence it impacts significant portions of wholesale inventory.



The above figure notionally illustrates how a 50 percent improvement in PSM processes (i.e., reductions in lead times and order quantities and their variability), while holding service levels and prices constant, could reduce wholesale inventory requirements by 40 percent or more.

In this document, we review how the LCMCs could achieve such reductions. That is, we review in detail the efforts the LCMCs have made toward implementing best PSM practices.

We begin in the next section with background on PSM. We also describe how we identified key characteristics of the evolution of a typical PSM organization from reactive and tactical to proactive and strategic.


In the third section we identify dimensions and factors associated with an evolution to PSM. This section includes a synthesis of the relevant literature, analysis of available data on PSM practices in the LCMCs, findings from interviews with LCMC personnel overseeing and executing PSM-related tasks, discussion of where the LCMCs are in their evolution toward best PSM

practices, and discussion of ways the LCMCs may wish to close gaps between their current practices and best PSM practices.

In the fourth section we summarize our findings from our interviews and analyses. In the last section we share our conclusions and recommend ways for AMC to close gaps that we identify.

2. Background on PSM

Outline

-  • **Background on PSM**
 - **Gap analysis methodology and identification of PSM evolution dimensions and factors**
 - **Findings from our interviews and analyses**
 - **Conclusions and recommendations**

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We begin with a discussion of the evolution in the commercial sector to best PSM practices.



Throughout the past century, purchasing practices have become increasingly important to the overall success of enterprises (Fawcett, 2000).¹⁰ Historically, purchasing was viewed as a clerical function designed to ensure that short-term supply met needs, with external purchases of goods and services accounting for about 30 percent of an enterprise's budget. Purchasing grew in importance for the military during World War II due to its critical role in the war effort, particularly as the federal government purchased more weapons and goods to support troops.

¹⁰ By "enterprise" we mean, as *Merriam-Webster's Collegiate Dictionary* defines the term, "a unit of economic organization or activity; esp[ecially] a business organization." We use this term to emphasize that while many of the practices we describe were developed for private business practices, they are applicable to business processes for goods and services purchased by other organizations, including the Department of Defense. That is, they are not restricted to private sector or for-profit entities.

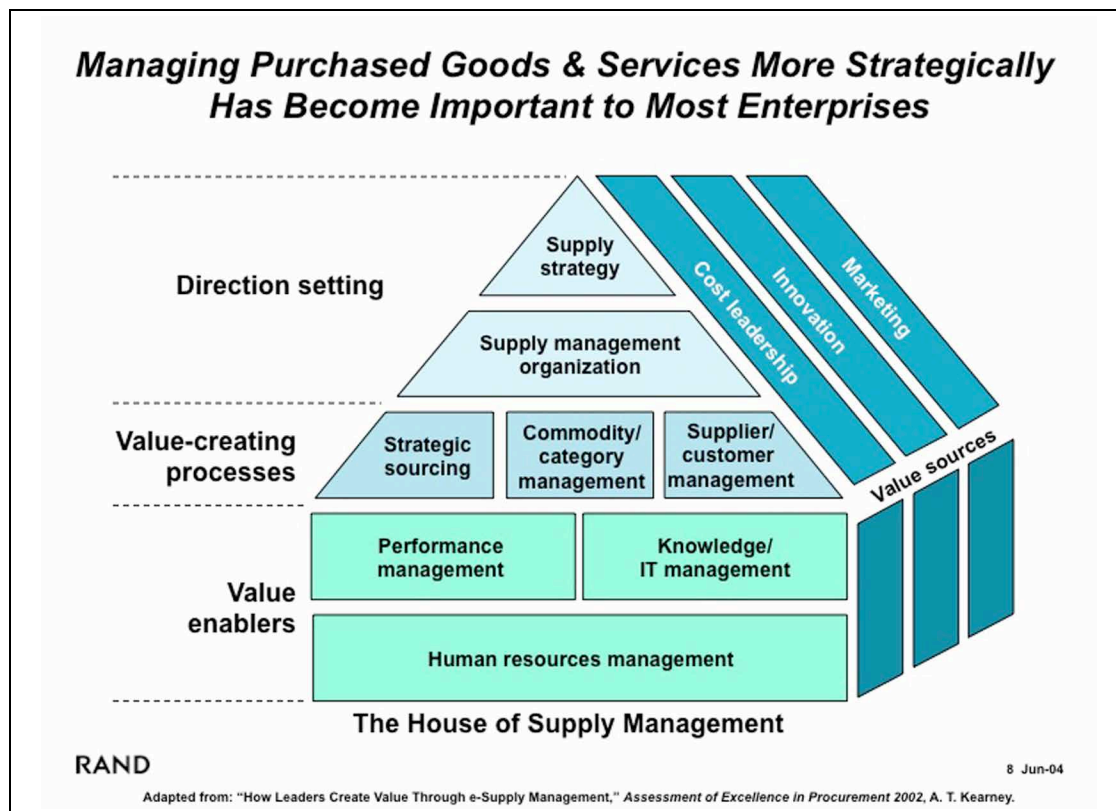
From the 1940s through the early 1970s, purchasing increasingly became a managerial rather than a clerical function. This shift coincided with the increasing importance of purchasing to organizational expenditures. Among the contributors to this shift were (Baily et al., 2005):

- Decreasing expenditures for labor and overhead resulting from automation and more efficient work processes; and
- Increasing expenditures for external resources resulting from
 - Outsourcing
 - Greater specialization by buying organizations
 - Easier access to world supply markets
 - Development of specialized contractors
 - Increasingly complex technology restricting the ability of organizations to make their own production inputs.

The importance of purchasing visibly increased again during the 1970s and early 1980s as scarcity and inflation became more prominent. In the late 1980s and early 1990s, the competitive success of Japanese automotive companies and their close partnerships with suppliers to support just-in-time manufacturing pushed purchasing toward a strategic role, including the development of supply strategies. As a result, while purchasing and supply processes fifteen years ago remained most concerned with getting the lowest prices, there was a greater awareness of other contributors to total costs such as quality and delivery as well as price (Baily et al., 2005). There were also more interactions between purchasers and suppliers and among other internal corporate functions.

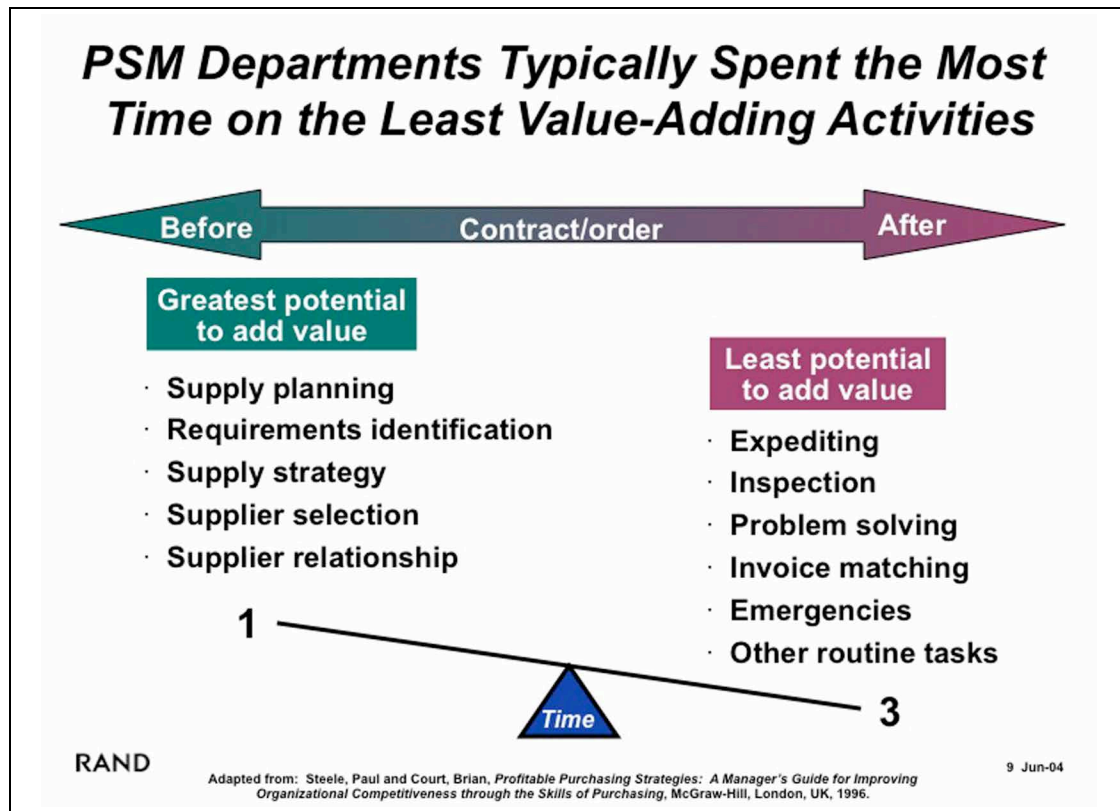
In recent years, as enterprises have sought to focus on their core competencies, outsourcing trends have further increased the importance of purchasing practices. Outsourcing has increased the importance of suppliers and supplier relationships in determining product quality, cost, and responsiveness to customers. Today, many enterprises spend up to 70 percent of their budgets on purchased goods and services. Purchasing and supply is

increasingly seen as a potential source of strategic advantage for an organization, requiring close collaboration with suppliers and with greater concerns for total costs (including pre-transaction and post-transaction) rather than just transaction price (Baily et al., 2005). Such trends will continue toward integrated supply chain management (SCM) of all parties in the value chain, from raw materials to the final customer (Monczka, Trent, and Handfield, 2002).



The trend to outsource non-core activities and the resultant increase in the relative size of purchased goods and service has increased the importance of strategically managing purchased goods and services for most enterprises. Strategically managing more purchased goods and services often requires major changes in an enterprise's PSM strategy development (e.g., developing rigorous, proactive supply or acquisition strategies linked to the enterprise's strategic goals), organizational structure, processes (e.g., strategic sourcing, commodity/category management, and supplier/customer management), and practices (e.g., long-term relationships, coordination, and collaboration), as well as enabling processes (e.g., developing and automating PSM organization and supplier performance metrics and personnel policies and practices that support supply strategy development and execution). The consultancy A.T. Kearney (2002) labels these tasks as direction setting, value-creating processes, and value enablers (see "House of Supply Management" figure above).

There is typically a time lag from when strategically managing purchased goods and services becomes important to an enterprise to when it recognizes the need to change from tactical, reactive buying to proactive, strategic PSM. Such a time lag can last years. For example, Caterpillar saw its revenues increase substantially each year from 2005 to 2008 but its operating profit decrease in that time (Hagerty, 2010). This was partly because its suppliers could not keep up with growth at Caterpillar, and Caterpillar was paying a premium to keep sufficient materials at its plants. This prompted Caterpillar to launch several initiatives to improve its procurement of materials.



It is not uncommon to find that the typical purchasing department is the scene of frantic, firefighting activity with all the effort directed at solving today's immediate problems.

—Steele and Court (1996)

There is considerable evidence that “firefighting” dominates many enterprises’ PSM activities (Steele and Court, 1996). At the earliest stages of the procurement cycle, before the contract or order is placed, enterprises should apply adequate time and resources to PSM activities that can add the most value, such as

- Supply planning
- Requirements identification and validation
- Supply strategy development
- Supplier selection
- Supplier relationships.

Those resources that do exist are often directed toward the wrong areas. They may not be focused on areas where it is possible to prevent many, if not most, problems. Many traditional purchasing departments spend the bulk of their time (typically in a three-to-one ratio) on the least productive PSM activities, such as

- Expediting
- Inspection
- Problem solving
- Invoice matching
- Emergencies
- Other routine tasks.

A 1998 Booz, Allen, & Hamilton cross-industry survey found a shift in time allocation for purchasers (Laseter, 1998) as enterprises moved from reactive, transactional buying to world-class PSM. Respondents reported that the time they spent on transactional buying had shrunk from 56 percent to 37 percent in five years and was projected to shrink another 12 percent over the next five years. The time spent on materials management had also shrunk from 26 percent to 18 percent in five years and was projected to shrink to 14 percent in the next five years. Meanwhile, the time spent by the purchasing function on analysis and developing a sourcing strategy grew from 19 to 27 percent in five years and was projected to grow to 33 percent over the next five years. The time spent on supplier development had grown from 13 to 20 percent over the past five years and was projected to grow to 28 percent over the next five years. The time spent in new product and process development had also grown slightly to 15 percent and was projected to grow to 19 percent.



The realization that more upfront time and resources are needed to prevent problems is shifting the PSM paradigm from reactively managing items and contracts within functional stovepipes to proactively managing suppliers and supplier capacity jointly across functions. In particular, major PSM activities are shifting from

- requirements determination, market identification, supplier selection, commercial (i.e., tactical) negotiation, order processing, monitoring/inspecting and auditing, expediting and firefighting, and data cleaning

to

- commodity strategy development, supply base management, supplier management, and supply chain management. Commodity strategy development includes requirements planning, industry and market intelligence, risk management, and strategic negotiations.

This includes establishing performance metrics to measure suppliers and the PSM organization. Supply base management includes rigorous assessments of supplier capacities and capabilities (including research, design, and technology innovation) and relative performance in key areas such as quality, cost, delivery, and reliability, typically leading to rationalization of the supply base to fewer, better suppliers. Supplier management begins with performance measurement, reporting, and evaluation and slowly expands, particularly for key suppliers,¹¹ to efforts to improve performance (Krause and Handfield, 1999). These management activities expand to meet current needs, subsequently to meet future needs, and eventually expand to lower-tier suppliers. Supply chain management involves increasingly closer collaboration, integration, and development of all participants in the supply value chain from raw materials to final customer.

A notional example may also help illustrate this shift. Reactive purchasing occurs when requirements for common parts across multiple weapon systems or services across facilities are independently generated and submitted to contracting for fulfillment. This often leads to separate contracts for each independent requirement, often with the same supplier. As a result, suppliers often react to what appears to them to be random orders with high prices and long lead times. For competitive items, such a process would require repeated market research for each new requirement. Such a process would also require management of many different contracts, increasing the amount of time contracting personnel must devote to administering contracts and managing suppliers as well as increasing the potential for data errors.

By contrast, a proactive organization forecasts and consolidates expected requirements for the same or similar goods and services across the enterprise.

¹¹ Key suppliers are often defined as those representing the most spending as well as those critical to product success (Boeing, 2007).

It establishes one or more supplier relationships, often long-term, for provision of these goods and services before the requirement actually occurs. Suppliers are given estimates of expected demand for contract-pricing purposes and see actual demands as they occur. Because of the larger, combined business they receive, suppliers often quote lower prices and shorter lead times than they would for many separate orders. Such consolidation also reduces contract administration and supplier management costs. Indeed, under such a long-term relationship, suppliers are often willing to work to continually improve performance and reduce costs throughout the supply chain.



The chart above illustrates how, as enterprises shift from managing items and contracts to strategically managing suppliers, supplier capacity, and the supply base, the organization and activities and mix of personnel shifts from tactical buying to strategic PSM. It also illustrates the automation of clerical, administrative, and transactional activities, focusing on higher-value analytic activities, replacing buyers with multi-functional PSM personnel (often organized into teams). Making this shift requires increasing personnel educational levels and analytic skills. (See Appendix B of Moore et al. (2002) for listings of PSM skills identified by three companies.)



This chart displays the general process many firms use as they change their PSM practices (see also Moore et al., 2002).

The first three PSM practices shown are often grouped together as *strategic sourcing* (Johnson, 2005). These practices are

- Conducting firm-wide analyses of “spend,” suppliers, markets, and supply chain risks, and are devising supply strategies based on these analyses. Spend analyses consider spending on different groups of goods and services, with different suppliers, and by different locations. Market analyses for strategic sourcing consider global supplier capabilities, performance, and capacities. The resulting supply strategies guide the organization in supply management and all other PSM processes and activities (Moore, Grammich, and Bickel, 2007).
- Rationalizing the supply base and consolidating contracts. Supply strategies typically call for consolidation of requirements and contracts for the same or similar goods and services. They may also call for

consolidation of existing contracts, particularly those that are sole- or single-source, with each supplier. In some cases supply strategies may call for increasing the number of suppliers to effectively manage supply risks. Over time, such practices lead to rationalization of the supply base with spending concentrated on suppliers that produce the lowest total cost of ownership needed to best meet current and future requirements in quality, delivery, cost, innovation, technology, capacity, and risk. Some practices that commercial firms undertake for supply-base rationalization may be limited by the Federal Acquisition Regulation.

- Establishing long-term partnerships with best suppliers. These steps are necessary to enable *supplier relationship management* (SRM).

The two principal practices of SRM are

- Helping key suppliers improve quality, cost, and service. As the supply base is rationalized, supply strategies often call for longer-term, performance-based relationships with strategic and other critical suppliers. Such relationships enable and help justify the costs of working with suppliers to eliminate waste, improve performance, and reduce costs.
- Integrating key suppliers into the organization. This may include sharing short- and long-term forecasts and business plans, locating personnel at buyer and supplier facilities, and integrating information-technology systems to facilitate rapid flow of information.

Shifting from Tactical, Reactive Buying to Proactive, Strategic PSM Takes 3 to 5 Years or Longer

- **Develop or acquire analytic capabilities**
 - Train and hire personnel
 - Make or buy tools for spend analyses, supplier performance measurement, total cost analyses
- **Rationalize the supply base**
 - Centralize buying of similar goods and services
 - Improve supplier selection and performance monitoring
 - Reduce the number of contracts with suppliers
- **Improve key supplier relationships**
 - Build trust by sharing and protecting plans and data and keeping commitments
- **Develop communication channels**
 - Internal and external

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Shifting from tactical, reactive buying to proactive, strategic PSM takes most large enterprises from three to five years or longer to accomplish. This is because PSM touches many different parts of an enterprise and requires a systems approach to change. It takes time to develop or acquire the analytic capabilities required to execute PSM. This includes time to train and hire personnel with the right skills as well as time to develop or buy and implement tools to support spend analyses, supplier performance measurement, and total cost analyses.

It also takes time to rationalize the supply base, which often requires centralizing the buying of similar goods and services enterprise-wide, improving the supplier selection and performance monitoring process, and reducing the number of contracts with the same suppliers.

Improving key supplier relationships requires time and effort to build trust by sharing and protecting plans and data, keeping commitments, and aligning strategies, goals, and incentives.

Lastly, it takes time to develop the internal and external communication channels to successfully execute PSM.

Critical Enablers of Effective Supply Strategy Development

- **Effective cross-functional teams**
- **Spend analysis and analytics**
- **Global contracting process**
- **Total cost analysis**
- **Benchmarking**
- **Supply market understanding**

RAND Source: CAPS Research, A.T. Kearney, Inc., Institute for Supply Management, "Succeeding in a Dynamic World: Supply Management in the Decade Ahead," as cited in Monczka, Robert M. and Markham, William J., "The Future of Supply Management – Part 1 Category Strategies and Supplier Management," *Supply Chain Management Review*, September 2007, p. 27 14 Jun-04

A study of the future of supply management by CAPS Research, A.T. Kearney, and the Institute for Supply Management (2007, pp. 26–27) identified six critical enablers of effective supply strategy development (i.e., supply strategies that are “more robust and focus on the total alignment of customers and suppliers to meet competitive objectives across the end-to-end supply chain”). These enablers are effective cross-functional teams to develop and execute the supply strategies, spend and other analyses that support the development of the strategies, a global contracting process that seeks the best world-class suppliers, total costs analysis that looks beyond price to identify all costs for supply strategy improvement, and supply-market understanding that also supports supply strategy development and supplier selection. For critical items, the strategies will become increasingly cross-enterprise and will require the engagement of executives in their development and execution.

Firms Report Substantial New and Ongoing Rewards in Performance from Improved PSM Practices...

- **Shorter, more reliable supplier lead times**
 - 7–10% per year delivery responsiveness
 - Sun repair parts turnaround time: 35–40 → 4–5 days
 - Rockwell Collins on-time delivery: 83.8 → 96.5% in 3 years
 - **Less inventory with higher service levels**
 - Cessna: 113% increase in turns over 6 years, with dramatically higher material availability
 - **Improved quality**
 - 10–13% per year
 - Honda of America: 7,000+ → less than 150 ppm* in 12 years
 - **Reduced product development time**
 - 22% in 8 years
 - GE jet engines: 60 months → 28 months
- *ppm: parts per million

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Sources: 1990s averages: Trent and Monczka, 1998. Sun: Pazmany, 2000. Rockwell Collins: Avery, 2005. Cessna: Avery, 2003. Honda of America: Fitzgerald, 1995 and Nelson, 1998. GE: Siekman, 2002.

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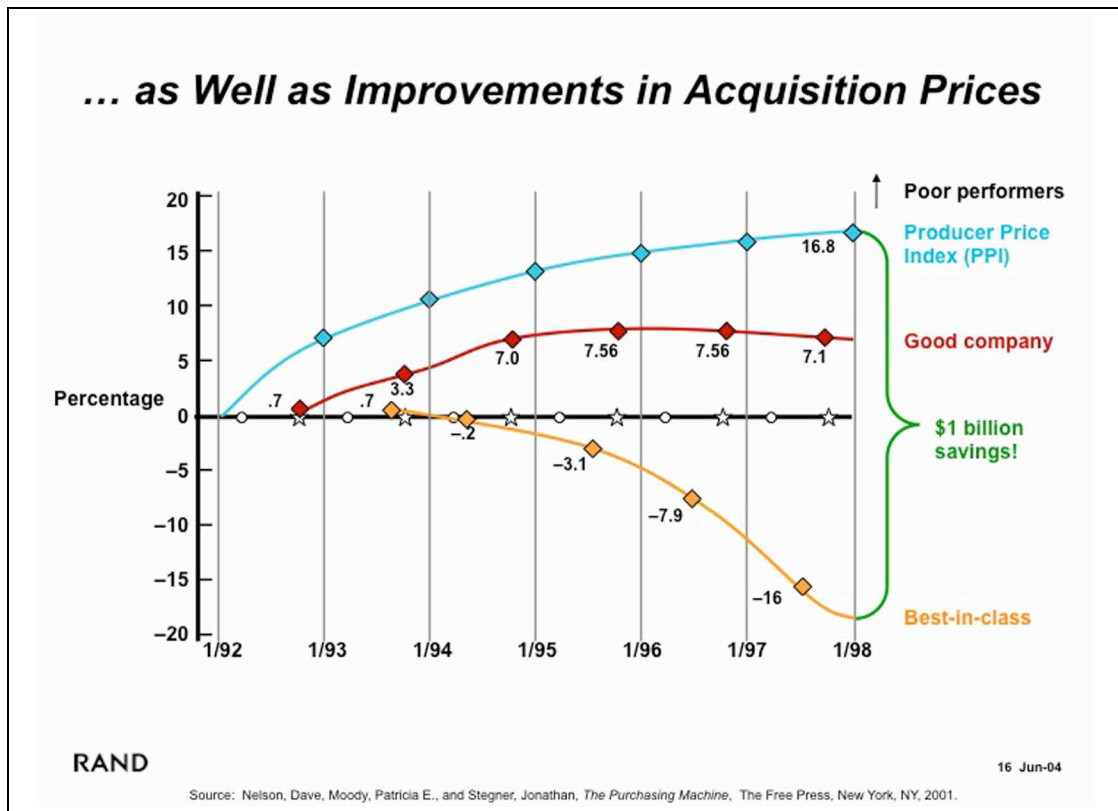
The academic and business literatures contain many examples of new and ongoing performance improvements resulting from implementation of best PSM practices. Key areas of focus have included requirements for performance improvement, placing more importance on purchasing, organization, systems development, performance measurement, supply-base measurement, and greater purchasing responsibilities and activities (Trent and Monczka, 1998). Among other benefits, this has helped companies achieve shorter and more reliable supplier lead times. A survey of leading companies found a 7 to 10 percent per year average improvement in on-time deliveries (Trent and Monczka, 1998). Sun Microsystems' service organization reported repair-parts vendors' turnaround times went from 34–40 days to 4–5 days (Pazmany, 2000). Rockwell Collins reported that supplier on-time delivery went from 83.8 percent to 96.5 percent in 3 years (Avery, 2005).

Companies also report requiring less inventory and obtaining higher service levels. For example, Cessna reported a 113 percent increase in turns over 6 years, with dramatically higher material availability (Avery, 2003).

Companies also reported 10–13 percent per year average improvements in quality, typically measured in defective parts per million (Trent and Monczka, 1998). Honda of America reported a reduction in defects from 7,000 parts per million (ppm) to less than 150 ppm in 12 years (Fitzgerald, 1995, and Nelson, Mayo, and Moody, 1998).

Lastly, companies reported an average 22 percent reduction in product development time over 8 years (Trent and Monczka, 1998). General Electric reported reducing development time for its jet engines from 60 to 28 months (Siekman, 2002).


Much of these improvements came from working with suppliers over time to improve performance.



The graph in the chart above, adapted from Nelson, Moody, and Stegner (2001), illustrates the extent to which a best-in-class Japanese transplant company was able to outperform the industry average Producer Price Index (PPI) for a specific group of goods. (While we remind the reader that reducing total cost is the ultimate goal, we use acquisition price here so as to illustrate efforts over time. There is no metric comparable to the PPI by which to compare total cost over time.) Its prices actually fell each year over a several-year period. The best-in-class performer even did markedly better than another recognized “good” company that had adopted some best PSM practices. This latter company did not yet have a sharp, focused approach to working with suppliers to reduce their costs and hence prices.

3. Gap Analysis Methodology and Identification of PSM Evolution Dimensions and Factors

Outline

- Background on PSM
-  • Gap analysis methodology and identification of PSM evolution dimensions and factors
- Findings from our interviews and analyses
- Conclusions and recommendations

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We next describe the methodology we used to conduct our PSM gap analysis and summarize what we found in the literature regarding the evolution of PSM organizations and their practices.

PSM Gap Analysis Methodology

- **Review and synthesize literature on characteristics of PSM organizational evolution**
 - **Develop composite PSM evolution framework**
 - **Develop interview protocol based on composite framework**
- **Analyze available data related to LCMC PSM practices**
- **Interview LCMC personnel overseeing and executing PSM-related tasks**
- **Identify LCMCs stage for each PSM factor**
- **Recommend ways for LCMCs to close key gaps**

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Our gap analysis methodology began with a review of the academic and business literature on the characteristics and practices of PSM organizations at different stages of evolution from historical, reactive, and tactical buying to proactive strategic sourcing and supplier relationship management. From that review we compiled a composite list of key characteristics, activities, and practices that define a PSM organization at each stage of evolution. From our composite list of PSM attributes, we developed an interview protocol¹² to help determine where AMC's LCMCs are in their evolution to world-class PSM.

We analyzed Contract Action Report (CAR) data from FY 1995 to FY 2006 for contracts written by AMCOM, CECOM, and TACOM. We identified the annual number of contracts and suppliers and dollars spent as

¹² See Appendix B for a set of interview questions and interviewee selection criteria.

well as the lengths of contracts. We calculated the average annual dollars per supplier and contract and number of contracts per supplier. We also analyzed Purchase Request Order Number (PRON) data for the three LCMCs to determine the average and maximum numbers of National Item Identification Numbers (NIINs) per contract and per supplier.

We interviewed selected leaders and personnel¹³ at the three LCMCs to gauge the extent of implementation of PSM practices (e.g., the use of market and spend analyses and the development of supply strategies). We developed a spreadsheet of all interview responses and assigned a PSM evolution score. These scores had a scale from 1 (tactical) to 5 (world-class) for each PSM attribute. From this scoring, we identified areas where AMC could improve its PSM implementation.

¹³ To gain frank feedback we promised interviewees that we would not disclose whom we interviewed nor use the information gathered to compare LCMCs.

Findings from the Literature

- **PSM organizations have many dimensions, e.g.,**
 - **Attributes**
 - **Activities**
 - **Practices**
 - **Time allocation**
- **Evolution of PSM often described in three to four stages along different dimensions**

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An enterprise's PSM is defined by its organizational structure, policies, practices, processes, and personnel. Thus, an evaluation of the status of an enterprise's PSM must consider all of these dimensions.

We reviewed a number of PSM textbooks and articles on the ongoing evolution of PSM organizations, practices, processes, and personnel. One theme was consistent: it takes three to five years or more to shift from tactical, reactive buying to proactive, strategic PSM. One reason it takes so long is that PSM organizations need to develop or acquire additional analytic capabilities. It takes time to train or hire new personnel and develop or purchase new analytic tools. It also takes time to automate clerical and transactional activities so that personnel can devote more of their time to analysis.

Another reason shifting from tactical buying takes so long is that strategic PSM also requires rationalizing the supply base and focusing on the most important suppliers. It takes time to measure supplier performance, assess supplier capacities and capabilities, and then shift business to the best suppliers,

improve marginal suppliers, and phase out poor-performing suppliers. It also takes time to improve relationships with key suppliers, build trust, and develop robust communications with them, all of which are necessary for supplier development, joint improvement initiatives, and close integration and collaboration.

Some authors describe the evolution of PSM in three phases (e.g., Syson, 1992; Raedels, 2000). Others characterize it in four phases (e.g., Dobler and Burt, 1996, Monczka, Trent, and Handfield, 2002; and Burt, Dobler, and Starling, 2003). We provide the following four examples of PSM evolution benchmarking.

**Example 1: Key Differences in Focus of
Three Stages of Purchasing**

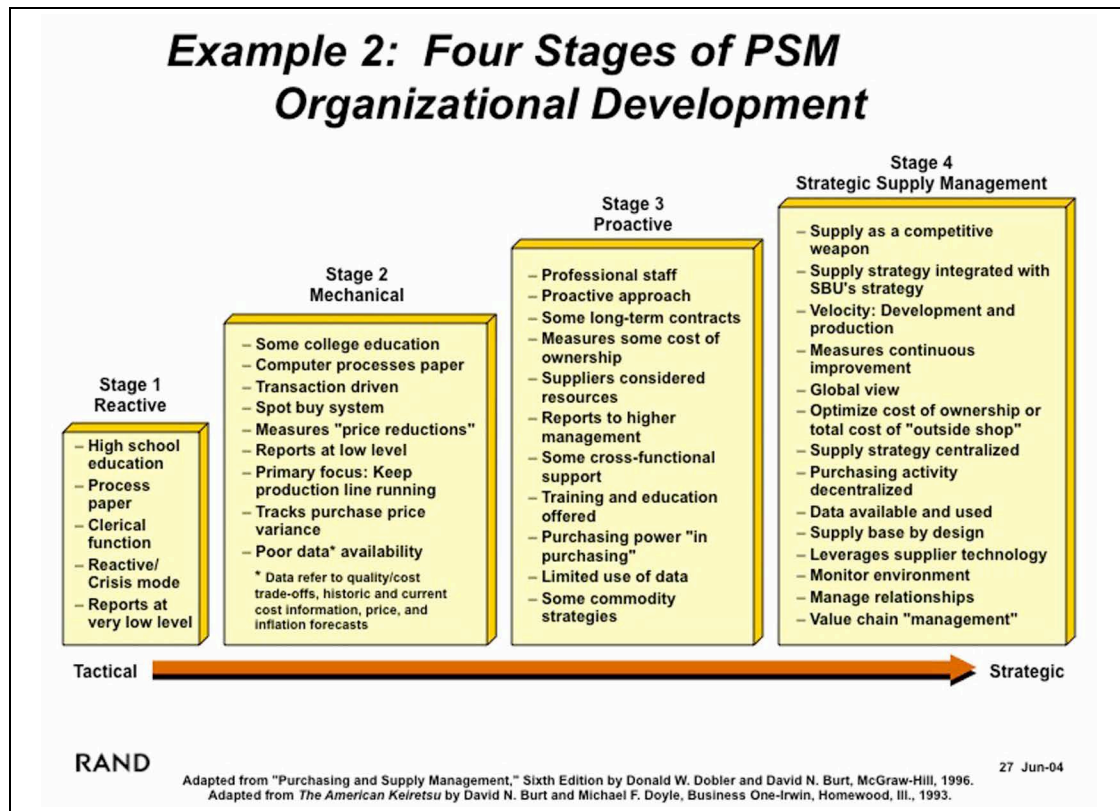
Stage 1 Traditional (Transaction)	Stage 2 Tactical ("Best Price")	Stage 3 Strategic (Integrated)
<ul style="list-style-type: none">• Purchase on price alone• Order processing• Preparation of solicitation proposals• Number of competitive bids• Target prices• Multiple sources• Many suppliers• Contract preparation• Requirements gathering• Bid evaluation• Order follow-up• Invoice reconciliation	<ul style="list-style-type: none">• Leverage volume for multiple to single sources• Company agreements• Goals for price, quality, and delivery• Supplier reduction programs• Supplier meetings• Intelligence gathering• Supplier cost estimating• Technical planning for negotiations• Conducting negotiations• Functional skill development	<ul style="list-style-type: none">• Total cost• Total value• Strategic suppliers• Optimizing supply base• Supplier development• Align with business strategies• Develop organizational strategies to meet future needs• Developing commodity and supplier strategies• Supply performance and relationship management• Participating in long-range business planning

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Source, Adapted from Raedels, Alan R., *The Supply Management Process*, Institute for Supply Management, Tempe, AZ, 2000.

Raedels (2000) segmented the evolution of purchasing from a transaction-based clerical function primarily focused on paperwork to a strategic PSM function into three stages, with a middle stage focused primarily on cost reduction. The table above lists some of the key differences in focus he identified as organizations shift from traditional, transactional purchasing (stage 1) to tactical, best-price focused purchasing (stage 2) to strategic and integrated PSM (stage 3).



The above four stages of PSM development were depicted in Dobler and Burt (1996). In the first, *reactive* stage, purchasing is a clerical function, operating in a reactive mode, reporting at a very low level, and requiring only a high school education of its personnel. In the second, *mechanical* stage, purchasing moves to more computer-based processes, requires some college education of its personnel, is driven by transactions, seeks to keep production lines running, tracks purchase price variance, but has poor data. In the third, *proactive* stage, purchasing becomes more proactive, includes some long-term contracts and commodity strategies, reports to higher management, includes some cross-functional support, requires a professional staff, but still has limited use of data. In the fourth, *strategic supply management* stage, supply is viewed as a "competitive weapon," is integrated with enterprise strategy, seeks to increase supply velocity (development and production), takes a global view and seeks continuous improvement, makes available and uses data, leverages supply chain technology, and includes value chain "management."

Dobler and Burt (1996) found that most leading enterprises had at least moved into the first two stages of PSM organizational development by the mid-1990s. We later discuss the Army's recent progress in these stages.

Example 3: Progression to World Class Supply Management

Stage Attribute	Clerical	Mechanical	Proactive	World Class
Emphasis	Convenience	Purchase price	Cost, quality, timeliness	Total cost
Relationships	Personal	Transactional/ adversarial	Transactional and collaborative	Transactional, collaborative, and alliance
Bottom-line impact	Overhead	Revenue neutral	Profit contributor	Increase shareholder value
Reporting	Very low level	Low level	Upper management	Member executive committee
Data	Not available	Used to expedite	Facilitates sourcing and pricing	Facilitates strategic planning

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Source: Adapted from Burt, David N., Dobler, Donald W., and Starling, Stephen L., *World Class Supply Management: The Key to Supply Chain Management*, McGraw-Hill Irwin, Boston, 2003, page 8.

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The above table outlines some key revisions in moving from PSM development to implementing world-class supply management (Burt, Dobler, and Starling, 2003). Note particularly the focus on total cost and increasing value and the elevation of reporting to the executive committee.

Example 4: Stages of Supply Management Strategy Evolution

1. Basic beginnings	2. Moderate development	3. Limited integration	4. Fully integrated supply chain
<ul style="list-style-type: none"> • Quality/cost teams • Longer-term contracts • Volume leveraging • Supply-base consolidation • Supplier quality focus 	<ul style="list-style-type: none"> • Ad hoc supplier alliances • Cross-functional sourcing teams • Supply-base optimization • International sourcing • Cross-location sourcing teams 	<ul style="list-style-type: none"> • Global sourcing • Strategic supplier alliances • Supplier TQM development • Total cost of ownership • Nontraditional purchase focus • Parts/service standardization • Early supplier involvement • Dock to stock pull system 	<ul style="list-style-type: none"> • Global supply chains with external customer focus • Cross-enterprise decision making • Full-service suppliers • Early sourcing • Insourcing/outourcing to maximize core competencies of firms throughout the supply chain

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Source: Monczka, Robert M., Robert J. Trent, and Robert B. Handfield, *Purchasing and Supply Chain Management*, 2nd edition, Cincinnati, Ohio: South-Western College Pub., 2002, p. 188.

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Monczka, Trent, and Handfield (2002) describe four phases through which organizations tend to evolve while developing their PSM capabilities. In their first phase, called *basic beginnings*, purchasing is characterized as a lower-level support function. Performance focuses on efficiency measures such as the number of purchase orders generated or dollars purchased per buyer. Information systems are primarily based on transactions. Initial efforts to improve upon these practices can include supply-base consolidation, leveraging of volume with leading suppliers, and longer-term contracts.

In their second phase of *moderate development*, the organization begins to centrally coordinate or control some part of purchasing across locations. A company-wide database may facilitate this. Purchasers begin to pursue strategic supplier relationships focusing on customer needs and the organization's competitive strategy. Purchasing is evaluated through achievement of competitive objectives, and suppliers are viewed as resources.

In their third phase of *limited integration*, purchasing strategies such as concurrent engineering (i.e., concurrent design of products and their related processes), supplier development, lead-time reduction, and early supplier involvement are established, and suppliers are integrated early into product and process design. Purchasing is viewed as a key part of the organizational structure with extensive functional integration and a strong focus on external customers. Purchasing activities are evaluated based on their strategic contribution. Information systems in this phase include global databases, historical pricing and cost information, joint strategy development efforts, and the beginnings of total cost modeling.

In their fourth phase of *fully integrated supply chains*, purchasing takes on a strategic orientation, reporting directly to executive management with a strong external customer focus. Activities least likely to add value (e.g., invoice matching) are automated. A “systems-thinking” perspective has been added that encompasses the entire supply chain and often involves direct intervention into the supplier’s operating systems and processes. Organizations fully integrating their supply chains may see total cost reductions across product lines ranging from 5 to 25 percent, as well as 75 to 95 percent reductions in defects per million and delivery times.

Once PSM organizations have recognized the need to change, they require considerable time to shift from one phase to another. Monczka, Trent, and Handfield (2002) note that few organizations have developed the more complex capabilities required for the third and fourth phases of strategic supply strategy development, in part because of the relative complexity of the strategies, the resources and commitment necessary to develop the capabilities, a failure to optimize supply bases, and a lack of personnel with the knowledge and skills necessary for developing advanced supply strategies.

***Literature Review Identified
Four Major PSM Organization Dimensions***

- 1. Functional attributes**
- 2. Activities**
- 3. Practices**
- 4. Time allocation**

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We aggregated and integrated the various characteristics that different authors outlined for the evolution of organizations from reactive, tactical buying to proactive, strategic PSM and put them into an analysis matrix with a scale of 1 to 5, where 1 is reactive, tactical buying and 5 is world-class PSM.¹⁴

In addition, we grouped the evolutionary characteristics identified in our literature review into four organizational dimensions: functional attributes (i.e., characteristics about the organization itself such as reporting level, education and skills of personnel, and the extent to which clerical and administrative tasks are automated), PSM activities (i.e., activities that personnel execute such as

¹⁴ Thus, a three-stage process became stages 1, 3, and 5 in our five-stage process. The first and last stages of a four-stage process became stages 1 and 5 in our matrix. Stages 2 and 3 of a four-stage process were positioned in either stage 2, 3, or 4 of our five-stage matrix depending on how well they correlated with other similar functional attributes.

market research, supplier selection, and management of supplier quality), PSM practices (i.e., the practices associated with implementing PSM such as cross-functional sourcing teams, spend analyses, and supply-base rationalization), and allocation of personnel time (i.e., the extent to which personnel time is devoted to various general purchasing activities such as transactional buying, sourcing strategy and analysis, and supplier development).¹⁵ (For further details, see Appendix B.)

Our literature review also identified personnel time allocation as another dimension of the evolution of a PSM organization. Hence, we included a percent time allocation for PSM-related personnel in aggregate PSM activities.

Some PSM attributes span multiple dimensions. This allows us to ask interviewees similar questions from different perspectives to try to understand nuances in implementation. For example, they may have implemented some world-class PSM activities, such as collaboration with suppliers, but only with a handful of suppliers. (See Appendix A for our interview protocol and topics we discussed.)

¹⁵ For key PSM activities, a 1 means never, a 3 is sometimes, and a 5 is often. For key PSM practices, a 1 means never, a 2 means seldom, a 3 means sometimes, a 4 means often, and a 5 means always.

***Interview Protocol Focused on
Four Dimensions of PSM Organizational Evolution***

- 1. Characterization of organizational attributes**
- 2. Level of utilization of specific PSM practices**
- 3. Responsibility for PSM activities**
- 4. Allocation of interviewee's time**

**Enabled exploration of key PSM factors
along different dimensions**

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From our matrices of PSM functional attributes, activities, practices, and time allocation, we developed an interview protocol that focused on the following viewpoints of the PSM organization:

- Organizational characterization
- PSM-related processes
- Level of utilization of specific PSM practices
- Responsibility for PSM activities
- Allocation of interviewees time

We started with questions related to the characterization of the organization to understand its structure, personnel, and relative power as well as to elicit interviewees' perceptions of their organization, which can vary by management level as well as functional position. Next we asked interviewees about PSM-related processes and their various roles in them. Our third group of questions related to the level of utilization of specific PSM practices such as

long-term contracts, written supply strategies, and supplier development. Our next group of questions concerned who was responsible for various PSM activities to better understand how responsibility and accountability were distributed. In addition to different viewpoints of the PSM organization, we asked questions about interviewees' allocation of time between various types of activities ranging from clerical/transactions activities to analytic and strategy development activities.

LCMC Interviews Included Key Stakeholders

- **Leadership**
 - **Materiel management**
 - **Contracting**
- **Execution personnel**
 - **Item managers**
 - **Contracting**
 - **Financial/cost analysts**
 - **Engineering**
 - **Customer representatives**
 - **Small business advocates**

LCMCs identified personnel and arranged all interviews

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We interviewed personnel at AMCOM, CECOM, and TACOM. Each LCMC arranged our interviews. We asked to interview a sample of leaders in materiel management and contracting in addition to separate interviews with PSM operational personnel. For our interviews of operational personnel, we asked to interview mixed groups of item managers, contracting specialists, financial/cost analysts, engineering personnel, customer representatives, and small business advocates.

At the start of our interviews, we told interviewees that we would not identify them but only their levels and functional expertise. We also said we would not compare LCMCs but rather would aggregate our findings across the AMC.

We conducted our interviews in a group setting, which we recognize can affect how respondents represent themselves and their work. This is one of the reasons we complement our interviews with data analyses.

LCMC Interviews

- **TACOM**
 - 26 April 2006 and 14–16 November 2006
 - 21 people interviewed
- **CECOM**
 - 15 February and 7–8 March 2007
 - 26 people interviewed
- **AMCOM**
 - 17–18 July 2007
 - 33 people interviewed

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Our TACOM interviews took place in April and November 2006. Our initial interviews largely focused on contracting personnel with some Integrated Logistics Supply Centers personnel (e.g., item managers) attending. Our subsequent interviews included item managers for four different systems, several systems analysts, several logistics managers for maintenance, and a Program Manager.

We interviewed leadership and execution personnel at CECOM in February and March 2007. These interviews included item managers and contracting specialists for four different systems, production engineers and acquisition customer representatives for three different systems, several financial analysts, logistics management specialists, and managers of logistics and contracting personnel.

Our AMCOM interviews were in July 2007. Personnel interviewed included several managers of logistics and acquisition personnel as well as representatives from continuous improvement and competition management.

In addition, we interviewed item managers, contracting specialists, engineering specialists, and performance-based contracting specialists for two different types of systems. Lastly, our interviews included representatives from the office of small business programs, the partnering division, the continuous improvement office, and competition advocate office.

Analysis of LCMC Interview Responses

- **Combined all interview responses by question**
- **Linked questions back to specific PSM dimensions**
- **Based on aggregate responses placed AMC on the evolutionary path for each PSM dimension**
 - **Responses often spanned PSM stages**


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We combined all LCMC interview responses for each question and synthesized what was reported. We then linked the questions back to specific PSM dimensions. Based on the aggregate responses, we estimated where AMC is on the evolutionary path to PSM for each PSM dimension. When responses spanned PSM stages, we indicated that AMC PSM capabilities varied.

4. Findings from Our Analyses and Interviews

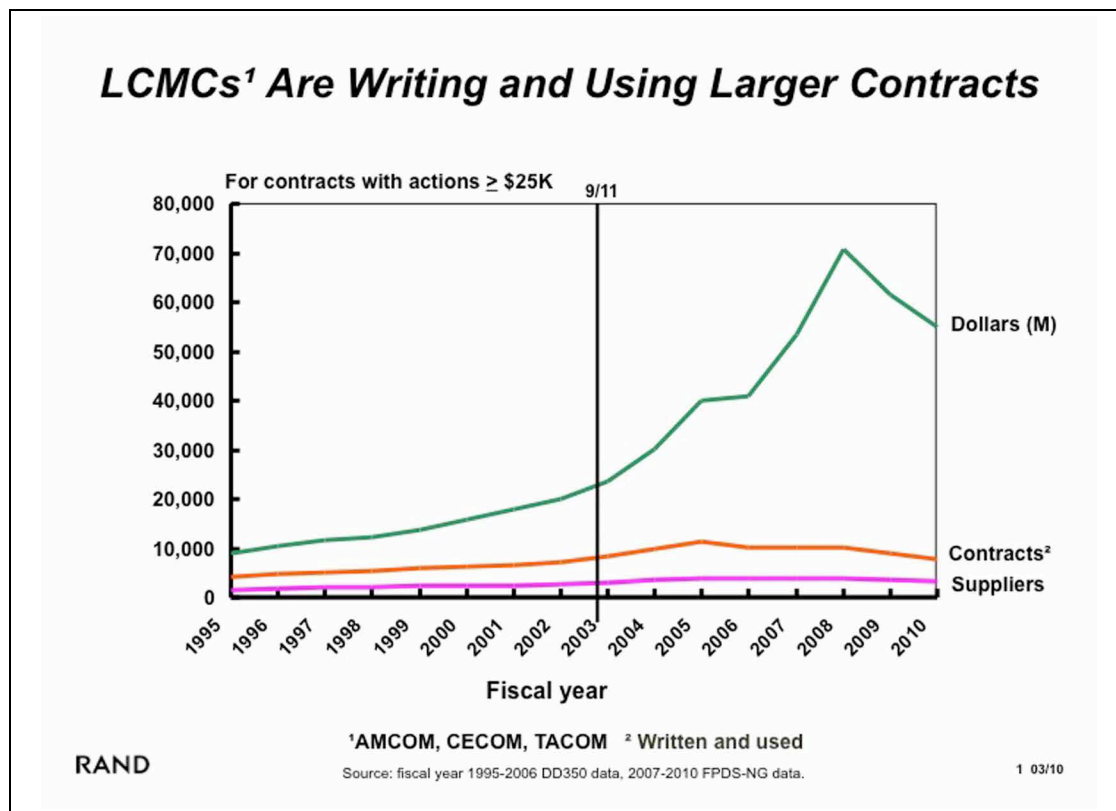
Outline

- Background on PSM
- Gap analysis methodology and identification of PSM evolution dimensions and factors
-  • Findings from our interviews and analyses
- Conclusions and recommendations

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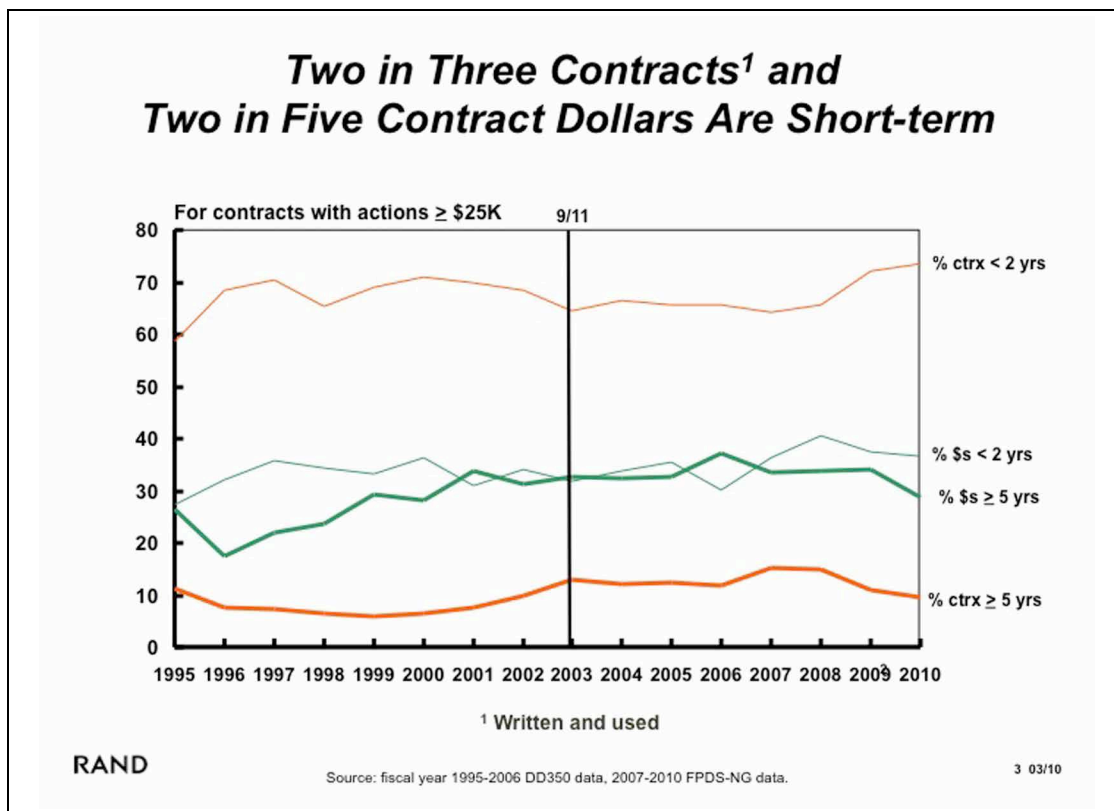
In the next section we summarize what we learned from our data analyses and interviews. For more details of our interview findings please see Appendix B: Interview Findings on PSM Organizational Dimensions.



This graph and those in the next two charts are based on an analysis of Contract Action Report (CAR) data for contracts written by AMCOM, CECOM, and TACOM from FY 1995 to FY 2010. This graph plots the annual total contract dollars (in millions of nominal dollars), number of contracts, and number of suppliers for the three LCMCs over this time period. (See Appendix C for actual numbers.)

It also shows how the U.S. responses to the terrorist attacks of September 11, 2001 (9/11) impacted dollars spent, contract writing, and suppliers utilized. The number of contracts with actions of at least \$25,000 that the LCMCs undertook increased from 6,577 in FY 2001 to 11,206 in FY 2005 but decreased to 7,729 in FY 2010. LCMC dollars spent on these contracts increased from \$18 billion in FY 2001 to \$71 billion in FY 2008 but decreased to \$55 billion in FY 2010. The number of suppliers on these contracts increased from 2,525 in FY 2001 to 3,863 in FY 2005 but decreased to 3,306 in FY 2010. In other words, following the September 2001 attacks, and

subsequent actions in Afghanistan and Iraq, LCMC expenditures appear to have increased faster than the number of contracts, which increased faster than suppliers. From FY 2008, when LCMC dollars on contracts with actions of at least \$25,000 peaked, the number of dollars spent on such contracts has decreased 23 percent, as has the number of such contracts, while the number of suppliers for such contracts decreased 15 percent.

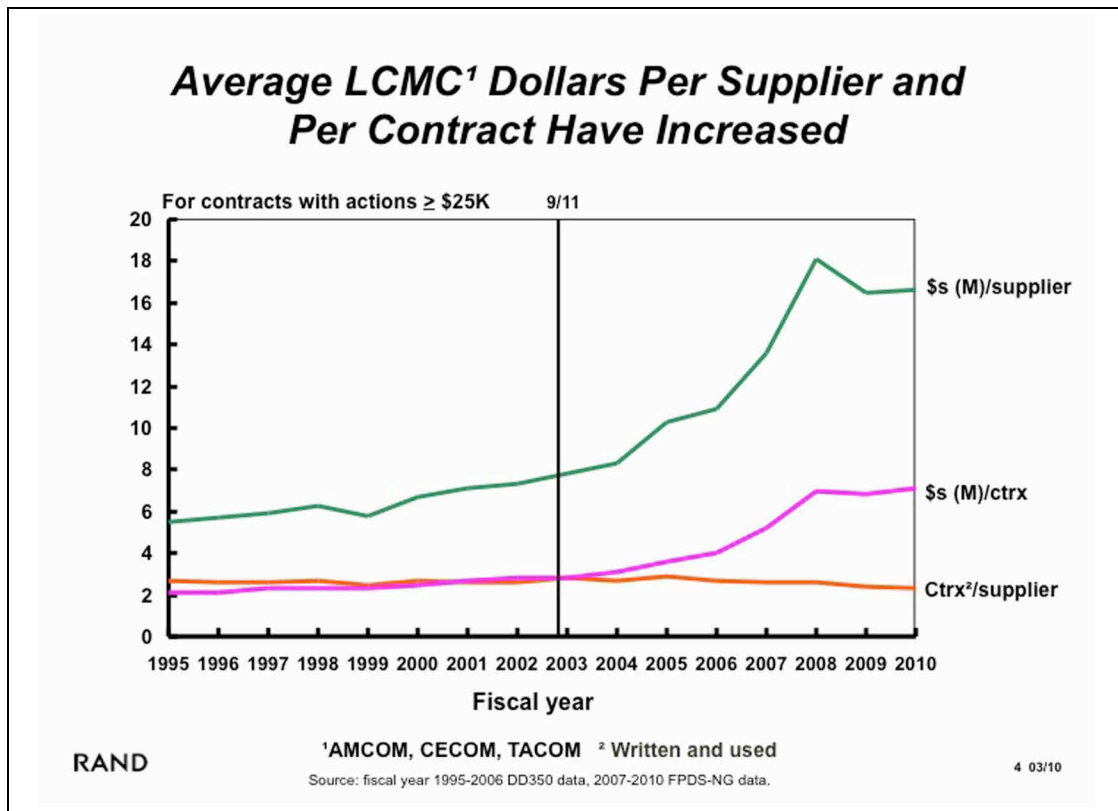


To calculate the length of contracts, we used the contract completion date¹⁶ in the CAR data and the dates the contracts were written. We calculated the total contracts written by the three LCMCs each year and the total dollars spent on those contracts that year. We then calculated the number of contracts that had completion dates longer than five years (i.e., >5 yrs), which is the official DoD definition of a long-term contract, and the dollars spent during the fiscal year on those long-term contracts. We divided them by the total number of contracts written and dollars spent during the fiscal year to get the percent of contracts written and dollars spent on those contracts each fiscal year. We calculated similar numbers for contracts that had completion dates of 4+, 3+, and 2+ years (not shown) from the date they were written to identify

¹⁶ "Completion Date," Line B4 of Form DD350.

the number of longer-term contracts and the extent of their length. Lastly, we calculated the percent of short-term and long-term contracts written by the LCMCs.

The above graph shows that most contracts with actions of at least \$25,000 that the LCMCs made in FY 2010 and, indeed, at least since FY 1996, were less than two years in length. These have accounted for about a third of spending on such contracts. This suggests that the LCMCs are spending most of their time and resources writing many short-term contracts for a relatively small portion of their total dollars.



This graph shows, on contracts with actions of at least \$25,000, the average annual dollars (in millions of dollars) per supplier, contracts per supplier, and dollars per contract for the three LCMCs from 1995 through 2010. The average dollars per supplier was slowly going up prior to 2001, then increased more rapidly through FY 2008 before dipping in FY 2009. The number of contracts (of at least \$25,000) per supplier was relatively stable through 2008 but, in FY 2009 and FY 2010, dropped to its lowest level since at least FY 2005. The average dollars per contract also increased rapidly from FY 2001 through FY 2008 and has remained relatively stable since then. (See Appendix C for the actual numbers.)

Average NIINs Per Spares Contract in FY07 Was Relatively Low

	All	AMCOM	CECOM	TACOM
total value \$s B	3.81	1.24	1.18	1.39
# NIINs	7,344	1,933	1,487	3,924
# contracts	4,612	1,339	286	2,987
# suppliers¹	990	386	137	585
# NIINs/contract				
Average	1.77	1.60	5.81	1.47
Maximum	226	118	226	70
# NIINs/supplier²				
Average	6.48	5.10	11.64	4.88
Maximum	498 Raytheon	240 Boeing	391 Raytheon	136 BAE

¹Numbers do not add because LCMCs share some suppliers

²Could not match all NIINs to suppliers

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Source: FY07 PRON and FPDS data

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Using FY 2007 data from each LCMC, we were able to calculate the average and maximum number of NIINs per contract and per supplier for AMC and for each LCMC. CECOM had the highest maximum NIINs per contract, 226, as well as the highest average number of NIINs per contract. TACOM had the lowest.¹⁷ CECOM also had the largest number of NIINs per supplier (with Raytheon) as well as the highest average NIINs per supplier. TACOM had the lowest, perhaps because it has more competitive items and

¹⁷ Spend analyses from the AMCOM PSM pilot for new spares and contractor overhaul contracts for the Attack, Cargo, Utility, and Scout weapon systems show that in FY 2004–2006 contracts averaged 1.15 NIINs per contract. AMCOM notes that one-time emergency buys to support the war effort increased the number of contracts. It predicts that more long-term contracts and reduced emergency-buy requirements will reduce the number of contracts in FY 2007 (University of Alabama in Huntsville and IBM, 2007).

different suppliers winning competitive bidding. More NIINs per supplier than per contract suggests that there *may* be opportunities within AMC to increase the number of NIINs per contract, particularly for sole-source items.

Some Suppliers and Contractor ID Codes Had Many Contracts In FY10

	All	AMCOM	CECOM	TACOM
# Contracts	19,814	5,383	7,150	7,499
# Suppliers	6,432	2,130	2,225	3,209
# Ctr ID Codes	7,370	2,453	2,521	3,589
# Contracts/supplier				
Average	3.1	2.5	3.2	2.3
Maximum	219 Raytheon	142 Lockheed	204 Sanmina- Sci Corp	128 BAE Systems
# Contracts/Ctr ID				
Average	2.7	2.2	2.8	2.1
Maximum	205 SCI Technology	77 Applied Indust Tech	204 SCI Technology	88 Connectec

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Source: FY10 FPDS-NG data

Some parent suppliers and their divisions (identified by contractor identification codes¹⁸) had multiple contracts in FY 2010. The average number of contracts per parent supplier was 3.1 for AMC and ranged from 3.2 at CECOM to 2.3 at TACOM.¹⁹ The median number of contracts was one, indicating that most suppliers had only one contract while some had many. The maximum number of contracts per parent AMC supplier was Raytheon, with 219 contracts. The average contracts per contractor ID code was slightly less than for parent firms, with AMC having an average of 2.7 and LCMC

¹⁸ A unique Dun & Bradstreet identification number given to different divisions and manufacturing locations of parent companies.

¹⁹ The average is higher for AMC than for any of the LCMCs because the LCMCs share some parent suppliers as well as the same business units or operating locations (i.e., contractor ID code).

averages ranging from 2.1 to 2.8. The median again was one contract per contractor ID code. CECOM had 204 contracts with SCI Technology, a contractor ID associated with Sanmina-Sci Corp.

Key Interview Findings (1 of 3)

- **Utilizing cross-functional weapon system teams to develop acquisition plans**
 - **Some members are not permanent**
 - **Limited cross-weapon system efforts**
 - **Suppliers**
 - **Commodities**
 - **Plans are seldom based on rigorous analyses of spend, suppliers, supply market, risks, total costs**
 - **Constrained by limited personnel time, travel monies, and analytic capabilities**
- **Writing more longer-term contracts**
 - **Data shows that most contracts are short-term**

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Our interviews indicated several ways in which the LCMCs are seeking to improve PSM practices, as well as continuing challenges to doing so. Topics our interviewees raised included cross-functional teams, efforts to write longer-term contracts, efforts to improve personnel qualifications, collaborations with leading suppliers, and challenges that other initiatives can pose to PSM improvements.

AMCOM, CECOM, and TACOM are using some cross-functional teams to develop acquisition plans. Not all teams or members of the teams are permanent. Some teams come together for specific procurements. The teams are organized primarily by weapon system, which limits cross-weapon system sourcing opportunities. While the acquisition strategies are based on analyses such as requirements forecasts, our interviews found that many analyses were not routinely performed prior to shaping the acquisition strategy. These included LCMC-, Army-, and DoD-wide spend analyses; detailed assessments of supplier capabilities and capacities (e.g., through site visits, performance

scorecards); detailed assessments of the supply market (e.g., to include emerging or developing new sources); supply chain risks (e.g., supplier or supply chain capacity constraints); and/or estimates of total costs (e.g., switching costs, costs of quality and responsive delivery, or transportation and handling costs).

Personnel understand that these analyses are important, but they typically do not have the time or resources to adequately perform them, particularly when they need to quickly establish a contract to meet the customer's required delivery date.

The interviewees noted that the LCMCs are moving to longer-term contracts. Nevertheless, as we have shown, most contracts being written are not long-term.

Key Interview Findings (2 of 3)

- **Upgrading personnel education and skill levels**
 - **Requiring degrees for new hires**
 - **Supporting training**
 - **Constrained by availability of personnel time, quality courses, travel monies, mentors**
- **Sharing forecasts with suppliers**
 - **Limited to a few LCMC pilots, e.g.,**
 - **AM General**
 - **Boeing**
 - **Not real-time or all demands**
- **Hosting some supplier meetings**

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Many leaders are placing a high emphasis on education. As a result, the LCMCs are continuing to upgrade the skills of personnel involved in PSM, particularly contracting specialists and item managers. The percentage of personnel with only a high school education is reported to be falling as many retire and are being replaced by those with bachelor's²⁰ or master's²¹ degrees. In

²⁰ Required by Core Certification Standards for acquisition personnel. Must also have at least 24 semester hours in accounting, law, business, finance, contracts, purchasing, economics, industrial management, marketing, quantitative methods, or organization and management for contracting personnel (10 U.S.C 1724 provides for limited exceptions). Not required for Core Certification of Life Cycle Logistics personnel, but a bachelor's degree in a technical, scientific, or managerial field is recommended in their Core Plus Development Guide (Defense Acquisition University, 2008).

²¹ In business administration or procurement recommended in Core Plus Development Guide for contracting personnel as maybe beneficial to career development or performance (Defense Acquisition University, 2008).

addition, a number of experienced personnel have pursued or are pursuing advanced degrees while they work.

New hires are given extensive training during their first two years, but the time-intensive nature of this training initially limits their on-the-job experience. A minimum of eighty continuous learning points is required every two years for all acquisitions, technology, and logistics workforce personnel (Aldridge, 2002). More experienced personnel are having trouble finding the time or travel resources for this training, particularly some courses required for advanced certification. There are some concerns about the quality of the training as well. Experienced personnel also have less time to mentor and train new hires, especially those being promoted and given more responsibility sooner. Some report that they do not feel comfortable with their new responsibilities.

LCMCs have started efforts to share their requirements forecasts with key suppliers. Initial efforts have been limited to a few suppliers. In some cases, LCMCs are only sharing repair-depot requirements and excluding field-level demands. They are also not yet sharing real-time demands with key suppliers, although demands are updated monthly.

One LCMC invites its top suppliers to a biannual meeting with the commanding general. This meeting is focused on supply chain issues and what suppliers and the LCMC can do better. LCMC personnel also report attending other industry days such as those hosted by the Defense Logistics Agency (DLA).

Key Interview Findings (3 of 3)

- **Thinking proactively about some issues**
 - **BRAC → Establishing contracts that span transition**
 - **Retirements → Hiring and training replacements**
- **Spread thin by multiple**
 - **Contingencies (e.g., GWOT, OEF, OIF, ...)**
 - **Initiatives (e.g., LMP, BRAC, Lean Six Sigma, SCOR, ...)**
 - **New personnel training**
- **Concerned that primary new tool, Logistics Modernization Program (LMP), is not meeting all PSM needs, e.g.,**
 - **Procurement administrative lead time (PALT) calculation**
 - **Lacking comprehensive supplier performance metrics**

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The LCMCs are also thinking proactively about some issues. For example, they are establishing contracts that span the BRAC depot-level repairables transferred to DLA to assure support during the transition. They are also hiring and training personnel in advance of the forthcoming wave of retirements.

Procurement personnel reported that they were spread thin by many different contingencies (e.g., Global War on Terrorism, Operation Enduring Freedom, and Operation Iraqi Freedom), initiatives (e.g., Logistics Modernization Program, Base Realignment and Closure, Lean Six Sigma, and Supply Chain Operational Reference-model), and new personnel training, all of which put additional demands on their time.

The primary new “tool” that the LCMCs have installed is the Logistics Modernization Program (LMP) implementation of SAP ERP.²² Initial experience indicates that it does not meet all PSM needs. For example, its calculation of PALT is not accurate. CECOM had to write a program outside of LMP to accurately calculate PALT. LMP also does not provide good supplier metrics such as on-time delivery. Finally, the LCMCs lack a comprehensive set of supplier-performance metrics, including delivery and quality, which are critical for good supplier management.

²² SAP AG (ISIN: DE0007164600, FWB: SAP, NYSE: SAP) is a German software corporation that makes enterprise software to manage business operations and customer relations. Among the company’s best known products is its enterprise resource planning application, SAP ERP. From Wikipedia.

Overall AMC Is Halfway Through a PSM Evolution (1 of 3)					
Organizational attributes	Status				
	1	2	3	4	5
Reporting level	Very low	Low	High	Very high	Top
Organizational characterization	Support/ low value function	Price reduction	Cost reduction/ performance improvement	Strategic/integral part of supply chain team	Supply as a competitive weapon
People	Clerical focus	Cross-functionally trained	Basics of sourcing strategy	Develop creative sourcing strategies	Add value
Personnel education levels	High school	Some college	Bachelors degree	Some graduate	Masters degree
Span of thinking	Order	Contract	Business unit	Enterprise	End-to-end supply chain
Operation mode	Reactive/ crisis mode	Mechanical/ transaction driven		Proactive/ some commodity strategies	Strategic/ supply management
Nature of activities	Clerical	Mostly clerical	Half and half	Mostly strategy development	Strategy development
Information systems	Poor data availability	Disjoint systems/ islands of automation	Limited data integration/ process automation	Enterprise-wide data warehouse/ electronic commerce	Total cost modeling
Automation	Paper	Transactions	Performance measurement	Communications	All non-value-added activities
RAND	Priority to improve	Needs improvement	Making good progress		

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The above and next two color-coded charts summarize our interview findings regarding each functional attribute of the organization identified in our literature review and summarized in Appendix B. We ranked activities with each of the attributes indicated in the first column. We used a 1-to-5 scale, with 1 reflecting very preliminary PSM efforts and 5 indicating the most innovative such efforts.

We color-coded our placement of AMC within the PSM evolutionary spectrum into red: the organizational attribute should be a priority to improve, yellow: needs improvement, and green: making good progress. As indicated, AMC appeared, at the time of this research, to be about halfway through an evolution to best PSM practices. For some functional attributes, we coded more than one stage of PSM evolution. This is because there was some variance in responses both within and between LCMCs. Some personnel referenced PSM only on a specific contract, while others discussed it throughout the Army or even across DoD.

Overall AMC Is Halfway Through a PSM Evolution (2 of 3)

Organizational attributes	Status of Organization				
	1	2	3	4	5
Internal focus	Purchasing function	Functional customer	Sub unit/ MAJCOM	Business unit/ Service/Agency	Enterprise/DoD
External focus	Weak customer		Customer		Strong customer
Evaluation metrics	Compliance, efficiency/ (e.g., # POs generated, \$\$/buyer)	Functional price reductions/ purchase price variance	Internal process outcomes	Extend to supply base performance	Customer/ supply chain/ enterprise outcomes
Strategy perspective	Local	Regional/ Divisional	National/ Business unit	Global/ Enterprise	End-to-end supply chain
Coordination and control	Decentralized		Business unit/ regional		Centralized/ center-led
Policy/ processes/ practices	Ad hoc/ decentralized		Hybrid	Center-led	Centralized
Functional cooperation/ integration	Silos/none	Little	Some	Extensive	Cross-functional teams
Level of internal trust	Low		Moderate		High
Organizational focus	Local		Business unit/ regional		Enterprise-wide

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The table above shows considerable variance in LCMC personnel's external focus, from a weak-customer to a strong-customer one. There was also considerable variance in evaluation metrics for LCMC personnel, from tactical and local compliance/efficiency metrics to broader, more strategic outcome and supply base metrics. In one case, that of internal focus, our interviewees indicated that they do a good job at the subunit and major command level, but not as well at lower levels of functional customer or at higher levels of the service or DoD.

Overall AMC Is Halfway Through a PSM Evolution (3 of 3)

Organizational attributes	Status of Organization				
	1	2	3	4	5
Supply strategy development	Decentralized at local level	Centralized at sub unit, regional/ divisional	Centralized at enterprise	Centralized at enterprise/ supplier's spend included	Centralized at enterprise/ global assessment of markets
Purchasing activity/ PO	Centralized at enterprise	Centralized at business unit	Centralized at sub-unit	Centralized at location	Decentralized
Supplier selection criteria	Price		Price and performance	Some cost of ownership	Total cost of acquisition and ownership
Supplier relationships	Short-term, adversarial, spot buys	Some long-term	Some strategic suppliers	Many preferred suppliers	Long-term, cooperative
View of suppliers	Adversary		Resource/ partner		Strategic resource
Level of external trust	Low		Moderate		High
Resource availability	Low		Moderate		High
Training and education	Little, poor quality		Some, good quality		Extensive, high quality
Internal power of purchasing	Low		Medium		High
External power of purchasing	Low		Medium		High

We found that supply strategy development was often decentralized at the local, weapon system level, with some weak centralization at the LCMC level across weapon systems.

AMC Market Research Activities Need to Improve						
Activity (1 of 2)	Frequency					
	N/A 0	Never 1	2	Sometimes 3	4	Often 5
Identification of purchasing needs ¹						
Discussions with requirements generators						
Involvement with materials specifications	Engr.					
Identification of suppliers						
Market studies						
Market research (rigorous)						
Monitoring of supply environment						
Development of supply strategy/ strategic materials acquisition plans (written)						
Analysis of proposals						
Selection of suppliers						
Supplier qualification and selection teams						
RAND	Done by another organization		¹ Requirements computation		47 Jun-04	

This and the next two charts present our assessment of the frequency of LCMC utilization of various activities associated with PSM.

We were told that the LCMCs always or very often did some activities, such as identification of the purchasing need, analysis of proposals, and selection of suppliers. A few activities, such as involvement with materials specifications, were done by organizations outside of purchasing and supply, such as engineering (coded in purple on the charts). Some activities, such as rigorous market research and monitoring the supply environment, were not done by purchasing and supply or other organizations responsible for their execution. In the case of monitoring the supply environment, we were told that this used to be done but was stopped due to a lack of personnel time (including a reduction in the overall number of personnel) and travel funds. Both of these activities, coded in red in the table above, are very critical to successful execution of PSM and thus should be a high priority for improvement.

AMC Needs to Improve Supplier Monitoring

Activity (2 of 2)	Frequency					
	N/A 0	Never 1	2	Sometimes 3	4	Often 5
Negotiations						
Establishment of partnering and strategic alliances						
Issuance of purchase orders						
Administration of contracts						DCMA
Purchasing records						
Management of supplier quality			DCMA			
Purchase of inbound transportation	USTC					
Monitoring of supplier continuous improvement		DCMA				
Management of investment recovery	DLA					
Participation in enterprise strategic planning						
Participation in make versus buy decisions			Comp'			

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LCMCs also negotiate with suppliers, issue purchase orders, and maintain purchasing records. The Defense Contract Management Agency (DCMA) administers large contracts, while the LCMCs manage smaller contracts. Some supplier quality is managed by DCMA, but DCMA is not currently responsible for monitoring supplier continuous improvement. Supplier performance measurement, monitoring, and improvement are critical activities of PSM. Thus, AMC needs to improve all of them. Given DCMA's role in contract administration and supplier quality, AMC will need to work with DCMA to improve these PSM activities.

Many LCMC purchases of goods are made FOB (freight on board) destination, which means that the supplier is responsible for the cost and risk of transporting the goods to the locations specified in the contracts. To improve performance and reduce total costs, a number of large companies have shifted the terms of their purchase of material from FOB destination to FOB origin so that they can strategically manage their inbound supply chain costs and

performance. The U.S. Transportation Command (USTC) is responsible for providing transportation services to all of DoD. Thus, any LCMC shift to purchasing material FOB origin will need to be coordinated with the USTC.

The LCMC personnel we interviewed indicated that they did not manage investment recovery (that is, efforts to manage surplus, obsolete, or scrap equipment to recover as much as the initial investment as possible), which is a DLA responsibility, or participate in Army-wide strategic planning.

AMC Needs to Broaden PSM Teaming and Improve Analytic Capabilities

Practices (1 of 3)	Frequency				
	Never	Seldom	Sometimes	Often	Always
Cross-functional sourcing teams					
Cross-unit sourcing teams					
Enterprise-wide sourcing teams					
Spend analysis					
Rigorous market analysis (depth/breadth)					
Rigorous total cost of ownership analysis					
Written, proactive supply strategy		Aq plan			
Supply strategy linked to enterprise strategy					
Consolidation of sole source contracts					
Aggregation of related requirements					

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This and the next two charts present the findings from our interviews on the frequency of utilization of key PSM practices. While the LCMCs often use the best PSM practice of cross-functional sourcing teams, they seldom use cross-weapon system or LCMC-wide sourcing teams. They also reported that they have not participated in Army- or DoD-wide sourcing teams. They indicated that they do not do rigorous market analyses (in both depth and breadth) or total cost of ownership analysis.

AMC needs to broaden its PSM teaming across LCMC and the Army and, when appropriate, participate in DoD-wide sourcing teams. It also needs to develop the capability to do rigorous market and total cost analyses, which are critical activities for realizing the benefits of PSM.

AMC Needs to Improve Its Supplier Relationship Management					
Practices (2 of 3)	Frequency				
	Never	Seldom	Sometimes	Often	Always
Volume leveraging					
Supply base rationalization					
Longer-term key supplier relationships					
Strategic supplier partnerships/ alliances					
Supplier development (cost, quality, delivery, lead time)					
Early Purchasing Involvement (EPI) in new product development	PEO?				
Early Supplier Involvement (ESI) in new product development	PEO?				
Material/service standardization					
Measures and tracks supplier performance/ improvement					
Establish Supplier Councils		Supplier meetings			

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AMC needs to improve its supplier relationship management (SRM). LCMCs reported that they seldom systematically rationalize the supply base, develop suppliers (i.e., help suppliers reduce costs or improve quality, delivery, and lead times), measure and track supplier performance and improvements, or plan and host regular, formal meetings with key suppliers that include LCMC and supplier leadership.

Several key PSM practices, Early Purchasing Involvement (EPI) and Early Supplier Involvement (ESI) in new product development, would be the responsibility of the Program Executive Office (PEO), if used. The personnel we interviewed were unsure where material/service standardization occurred.

Some private-sector practices, such as supply-base rationalization or helping suppliers reduce costs or improve quality, delivery, and lead times, might not be permitted under the Federal Acquisition Regulation, or would have to be handled carefully to stay in compliance.

AMC Needs to Improve Its Supplier Relationship Management

Practices (3 of 3)	Frequency				
	Never	Seldom	Sometimes	Often	Always
Develop preferred supplier program					
Leverage supplier capabilities (e.g., technology)					
Monitor supply environment		Engr.			
Establish long-term supplier relationships for service parts before initial product production starts	PEO?				
Share technology roadmaps with key suppliers	PEO?				
Share plans with key suppliers					
Share long-term forecasts with suppliers					
Share short-term forecasts with suppliers					
Share real-time demand data with suppliers					


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Additional SRM-related PSM practices that AMC needs to improve include developing a preferred supplier program, leveraging supplier capabilities (e.g., technology), monitoring the supply environment to identify prospective opportunities as well as risks, and sharing forecasts and plans and real-time demand data with key suppliers. Other PSM practices, such as establishing long-term supplier relationships for service parts support before initial product production begins and sharing technology roadmaps with key suppliers, would also be the responsibility of the PEO, which suggests that for successful implementation, PSM activities in AMC need to better integrate product development with product support.

5. Conclusions and Recommendations

Outline

- **Background on PSM**
- **Gap analysis methodology and identification of PSM evolution dimensions and factors**
- **Findings from our interviews and analyses**
-  • **Conclusions and recommendations**

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In this final section we provide conclusions and recommendations to improve AMC's PSM implementation.

Conclusions

- **AMC is moving toward world-class PSM**
 - **Ranks in the middle on most factors**
 - **Making good progress in some areas**
 - **Improving the education level of personnel**
 - **Behind in other areas**
 - **Spend analysis and analytics**
 - **Market research**
 - **Losing ground in other areas**
 - **Supplier analysis**

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The results of our analyses and interviews with LCMC personnel indicate that the LCMCs and AMC are moving toward world-class PSM. LCMCs have adopted most of the best PSM practices to at least some degree, but their implementation is not widespread. Some practices, such as sharing forecasts and meeting with suppliers, need to be more broadly implemented.

For many factors associated with world-class PSM, AMC is in the middle of the evolution. It appears to be making some progress in such areas as improving the educational level of personnel and moving to longer-term contracts. It is behind in other areas, such as rigorous analysis of spending, markets, risks, and total costs and factors associated with SRM. AMC and the LCMCs need to develop organic capabilities to analyze spending from an LCMC-, Army-, and DoD-wide perspective. For example, AMCOM analyzed a portion of its spend for its PSM pilot with the assistance of IBM. Such efforts need to be expanded to the other LCMCs and to AMC HQ.

In some areas AMC has lost ground, such as in supplier analysis. It needs to ensure that the resources are available to properly measure and manage supplier performance and assess supply markets.

Recommendations (1 of 3)

- **Form supplier teams for top/key suppliers**
 - **Consolidate sole source contracts**
 - **Develop supplier scorecards**
 - **Enhance/develop joint collaboration, planning, and forecasting**
 - **Formalize/standardize high-level, AMC-wide supplier meetings (e.g., supplier councils) that**
 - **Promote two-way dialog on ways to improve**
 - **Share future plans, technology roadmaps**
 - **Plan and highlight improvement initiatives**
 - **Present supplier awards**

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AMC needs to develop supplier teams for its top suppliers. If Army spending with a specific supplier is concentrated at one LCMC, then the supplier team for that supplier should be located at the LCMC. If spending with a specific supplier is fairly evenly spread among two or more LCMCs, then the supplier team should be at AMC HQ or at the LCMC with larger spend. The current structure of LCMCs may also impede best PSM practices, as we discuss in Appendix D.

Supplier teams need to first look at consolidating, as much as possible, all sole-source contracts with the supplier (or at least supplier divisions). They also need to develop supplier scorecards that include quality, delivery, and cost metrics. If AMC already has a Collaborative Planning, Forecasting, and Replenishment (CPFR) initiative with a specific supplier, then it should strengthen it as much as possible by sharing more data on all requirements and real-time demands. If AMC does not have a CPFR initiative with a top supplier, it should develop one.

Eventually, both the supplier scorecard and CPFR programs should be automated as much as possible and placed on the web for real-time interaction. In concert with these ongoing efforts, AMC should develop supplier councils for its top suppliers. Such councils would help standardize supplier scorecards and CPFR efforts across AMC as well as identify opportunities for joint improvement initiatives.

Recommendations (2 of 3)

- **Form category teams for key commodity groups**
 - **Aggregate competitive requirements across weapon systems**
 - **Rationalize suppliers**
 - **Standardize commodities wherever possible**

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AMC also needs to develop category or commodity teams for its key commodity groups. These teams would aggregate competitive requirements across weapon systems, rationalize suppliers, standardize parts across weapon systems as much as possible, and seek ways to leverage AMC spending and better manage suppliers of key commodities. Appendix D presents one way LCMC teams can be improved for PSM.

Recommendations (3 of 3)

- **Develop analytic capabilities**
 - **Spend analyses**
 - **LCMC-, Army-, and DoD-wide**
 - **Commodity/category group**
 - **Suppliers**
 - **Weapons**
 - **Supplier and supply base analyses**
 - **Measure supplier performance**
 - **Total cost of ownership analyses**
 - **Supply chain risks analyses**

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Finally, AMC needs to develop the analytic capabilities at AMC headquarters and the LCMCs to support world-class PSM. This includes the capability to do rigorous LCMC-, Army-, and DoD-wide spend analyses by commodity, suppliers, and weapon system. It also includes rigorous supplier, market, and supply-base analyses as well as supply-chain risk analyses. AMC needs to develop effective data systems to include supplier performance measurement to support these analyses.

AMC has made considerable progress toward achieving best PSM practices. These next steps will bring further improvements in supplier performance and costs.



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Appendix A: Interview Protocol

Based on our review of the literature from Chapter 3, we developed four tables around functional attributes, activities, practices, and allocation of time that summarize the evolution of PSM. Please see Appendix B. We used those tables to develop our interview protocol, which we reproduce below. Interviews were done orally. Among other questions, interviewees were asked the percent of time they spend on differing activities. RAND researchers used the tables in Appendix B to organize and “score” what they heard during the interviews.

Overview of Interviews (as provided to interviewees)

Statement of Purpose

The purpose of our interviews is to develop a detailed baseline of the extent and depth of LCMC utilization of best practices in purchasing and supply management PSM AMC-wide. The LCMC's have been utilizing many best PSM practices. The baseline will help AMC understand where utilization needs to be extended and expanded, AMC-wide. A second purpose of our interviews is to map current LCMC processes related to PSM, such as requirements grouping, determination, and communication, supplier contracting and relationships (e.g., management, communication, and information flows), and order placement and fulfillment.

Methodology

Multiple personnel interviews will be used to develop an in-depth understanding of each LCMC's PSM related practices and processes. A review of LCMC briefings and web pages and preliminary discussions indicate that while the LCMC's have utilized many best PSM practices, they are not being

routinely utilized AMC-wide or synergistically implemented. We plan to interview the following personnel at each LCMC:

- Five groups of five to seven functional personnel involved in PSM activities (e.g., small business advocate) to include at least one item manager, contracting specialist, sustainment engineer, and financial/data specialist in each group.
- Three or more senior managers overseeing item management activities.
- Three or more senior managers overseeing contracting activities.
- Other personnel as suggested by the LCMC or as needs are identified during interviews.

Research Results

The results of our interviews, without attribution, will be summarized in a briefing and documented in a report.

Interview Protocol Purchasing and Supply Management (PSM) Processes and Practices

Please note that we will not disclose the names of the personnel we interview. We are collecting contact information solely for the purpose of clarifying responses or collecting additional information.

Date: _____

Location: _____

Interviewee(s):

Name(s) _____

title(s) _____

phone numbers _____

A. Organizational characterization:

1. What is the *name* of your organization?
2. What is the size of your organization?
3. To whom do you *report* (e.g., name and title) and at what *level* are they within your organization?
4. What are the *enterprise-wide goals and objectives* for purchasing and supply management (PSM) activities?
5. How is *progress measured* against those goals and objectives?
6. What *functional skills* are represented in your organization (e.g., item management, contracting, engineering, quality control, small business, financial management, logistics)?
7. What is the general *educational level of personnel* in your organization? How much does this vary between individuals?
8. How would you generally characterize the *availability of resources* for your organization (e.g., low, moderate, high)?
9. How would you generally characterize the *level, frequency, and focus of training* for your organization (e.g., low, moderate, high)?
10. How would you generally characterize the *types of activities performed* by your organization (e.g., clerical, administrative, analytical, strategy)?
11. How is the organization's time typically distributed among the following activities (i.e., percent)?
 - a. Transactional buying
 - b. Material management
 - c. Sourcing strategy and analysis
 - d. Supplier development
 - e. New product and process development
 - f. Other (please specify)

12. How would you generally characterize the *operational mode* of your organization (e.g., firefighting, reacting to requirements, proactively managing risks, planning for future)?
13. How would you generally characterize the *availability of information/data* in your organization (e.g., poor, limited, semi-integrated, totally integrated)?
14. How would you generally characterize the *level of automation* in your organization (e.g., totally paper, partially automated, totally automated)?
15. How would you generally characterize the *span of thinking* of your organization (e.g., order, contract, organization, enterprise, end-to-end supply chain)?
16. How would you generally characterize the *focus* of your organization (e.g. internal and/or functional, enterprise-wide, external customer)?
17. How would you generally characterize your organization's *strengths*?
18. How would you generally characterize the *strategy perspective* of your organization (e.g., short-term/local, long-term, end-to-end supply chain)?
19. How would you generally characterize the *metrics used to evaluate your performance* and that of your organization (e.g., compliance, functional, process outcomes, customer outcomes)?
 - a. What specific metrics are used to evaluate your performance and what is their order of importance?
 - b. What specific metrics are used to measure your organization's performance and what is their order of importance?
20. How would you generally characterize the *degrees of coordination, control, and policy* within your organization/enterprise (e.g., decentralized, center-led, centralized)?
21. How would you generally characterize the *degree of standardization of practices and processes* within your organization/enterprise (e.g., ad hoc/decentralized, hybrid, centralized)?

22. How would you generally describe the *level of cooperation and integration* between functions within your enterprise (e.g., between contracting, supply, legal, finance)?
23. How would you generally describe the *level of trust* between internal organizations (e.g., low, moderate, high)?
24. How would you generally characterize the *degree of centralization* of supply strategy development (e.g., decentralized, or centralized)?
 - a. What is the degree of centralization of supply management?
 - b. What is the degree of centralization of purchasing?
25. How would you generally characterize the *criteria used to select suppliers* (e.g., price, performance, total cost of ownership)?
26. How would you characterize *management of the supply base* (e.g., level of effort, time horizon, etc.)?
27. How would you generally characterize the *nature of your supplier relationships*?
 - a. Length of contracts (e.g., short-term, mid-term, long-term)?
 - b. Level of cooperation (e.g., adversarial or cooperative)?
28. How would you generally characterize your organization's *view of suppliers* (e.g., vendor, partner, strategic resource)?
29. How would you generally characterize your organization's *level of trust of suppliers* (e.g., low, moderate, high)?
30. How would you generally characterize the *internal level of power* of PSM within your enterprise (e.g., to influence enterprise strategy or access resources)?
31. How would you generally characterize the *external level of power* (e.g., leverage) of PSM for your enterprise (e.g., with key suppliers, industry)?
32. What other initiatives are ongoing in your organization and how much of your time to they require?

B. PSM-related processes

1. What is (are) the standard process(es) your organization uses for supply management?
 - a. Requirements determination
 - i. Demand forecast
 - ii. Washout rate determination
 - iii. Administrative lead times
 - iv. Production lead times
 - v. Safety stock
 - b. Uncertainty and risk analyses
2. What is (are) the standard process(es) your organization uses for purchasing or strategic sourcing?
 - a. Market research
 - b. Supplier qualification
 - c. Supply risks identification and mitigation
 - d. Supplier selection
 - e. Determination of contract terms and conditions
 - i. Contract length
 - ii. Contract type (e.g., firm fixed price, time and materials)
 - iii. Performance incentives
 - f. Total ownership cost of purchase
3. What is (are) the standard process(es) your organization uses for supplier management?
 - a. Supplier performance measurement
 - b. Supplier recognition
 - c. Supplier development
 - d. Joint supply chain improvement initiatives

C. Level of utilization of specific PSM practices

For the following PSM practices please provide evidence of the *frequency* and *quality* of their utilization and provide *examples*, where appropriate, of where they are applied.

1. Sourcing teams
 - a. Cross-functional
 - b. AMC-wide
 - c. Army-wide
 - d. DoD-wide
2. Rigorous analysis (e.g., depth and breadth)
 - a. Spending
 - b. Past, current, and future requirements
 - i. Minimum and maximum
 - ii. Level and nature of variance
 - c. Markets/industries intelligence (e.g., what knowledge has been developed and is continually maintained?)
 - i. Trends
 1. New entrants (e.g., what processes does the Army have to identify new suppliers?)
 2. Consolidations
 3. Technologies
 4. Substitutes
 - ii. Best practices for supply terms and conditions
 - d. Suppliers (i.e., current and prospective suppliers regardless of what they are currently producing for the Army or others)
 - i. Capacities
 - ii. Core capabilities
 - iii. Additional capabilities
 - iv. Financial stability

- v. Cost structure
 - e. Costs
 - i. Key cost drivers
 - ii. Target cost (i.e., what customer is willing to pay)
 - iii. Should cost (i.e., materials, labor, and reasonable overhead to manufacture)
 - iv. Total cost of ownership
 - f. Risks of supply disruptions (e.g., contingencies)
 - i. Probability
 - ii. Duration
 - iii. Level of impact
- 3. Supply strategies for all commodities (material acquisition plans?)
 - a. Written
 - b. Proactive
 - i. Address future needs as well as current needs
 - c. Flexible
 - i. Adapt to changes in demands/requirements
 - d. Focused on lowering total costs of ownership
 - i. Administration/transactions
 - e. Effectively manage/mitigate risks and uncertainty (e.g., from supply disruptions or contingencies)
 - i. Supply availability
 - ii. Capacity to handle surges
 - iii. Quality control
 - iv. Total costs
 - v. Delivery (e.g., reliability to deliver during surges or spikes in demand)
 - f. Enterprise-wide
 - g. Linked to enterprise-strategy

4. Requirements/demand management
 - a. Early Purchasing Involvement (EPI) in new product development
 - b. Standardization of material/services wherever possible
 - c. Level/smooth orders as much as possible (e.g., reduce variance to suppliers through smaller, more frequent, less variable orders/buys where beneficial)
5. Supply base management
 - a. Increase Army buying power
 - i. Aggregation of related requirements to create greater leverage/volume with key suppliers
 - ii. Rationalization of supply base (e.g., fewer, better suppliers)
 - iii. Longer-term, more stable relationships
 - b. Reduce total transactions costs to the Army and its suppliers
 - i. Consolidation of sole source contracts with the same supplier
 - c. Improve health and stability of supply base where needed
 - i. Smoother, more stable orders
 - d. Monitor
 - i. Supply environment
 - ii. Supplier's performance, capacities, and capabilities
6. Supplier capacity management
 - a. Assure availability and capacity of at least one source of supply
 - b. Require supplier risk management and contingency plans
 - i. Review regularly
 - c. Link purchase of low demand material
 - i. Higher volume material
 - ii. Similar low demand material
 - d. Qualify new entrants
 - i. Establish "cottage industries" if none exist
 - ii. Low demand/quick change core competencies

- e. Split large orders (i.e., even if it costs more to develop a second source)

7. Supplier relationships

- a. Use flexible contracts to accommodate changes in requirements/demands
 - i. Surges (e.g., minimum and maximum quantities)
 - ii. Variable quantity pricing
- b. Clearly communicate expectations
- c. Establish sustainment contracts for service parts and repair BEFORE initial product production begins (i.e., NOT after it ends)
- d. Develop preferred supplier program
- e. Use longer-term contracts with key suppliers
- f. Establish Partnerships/alliances to enable improved supplier integration
- g. Involve suppliers early (i.e., Early Supplier Involvement (ESI)) in new product development
- h. Leverage supplier capabilities (e.g., technology, management)

8. Supplier integration

- a. Share information/data (e.g., Collaborative Planning, Forecasting, and Replenishment – CPFR) -If applicable, please specify what data is shared with suppliers for the following:
 - i. Plans
 - ii. Demand history (e.g., total, depot only, non-depot only)
 - 1. Washout rates for repaired parts
 - iii. Short-term forecasts
 - iv. Long-term forecasts
 - v. Real-time
 - 1. Demands (e.g., total, depot only, non-depot only)
 - 2. Inventory levels
 - vi. Technology roadmaps
- b. Integrate IT systems

- c. Exchange personnel at sites

9. Supplier management

- a. Supplier certification programs
- b. Supplier performance (e.g., scorecards)
 - i. Measure
 - ii. Track
 - iii. Provide feedback
 - iv. Utilize
 - 1. Future supplier selection (e.g., rationalize supply base)
 - 2. Evaluation of PSM activities
- c. Established goals and incentives for supplier improvements (i.e., motivate continuous improvement)
- d. Recognize and reward
 - i. Superior supplier performance
 - ii. Supplier improvements
- e. Oversee any needed “get-well” plans
- f. Supplier Councils
 - i. Two way communications
 - ii. Joint collaboration and cooperation initiatives
- g. Appoint high-level manager for each key supplier

10. Supplier development

- a. Joint cost and performance improvement initiatives
 - i. Reduce total supply chain costs
 - ii. Improve quality
 - iii. Reduce lead times
 - iv. Improve reliability of delivery
 - v. Share total cost savings
 - vi. Improve supplier capacity (e.g., to handle surges in demand)

D. Responsibility for PSM activities

For the following PSM activities please indicate what Army functions/organizations have the primary responsibility for these activities, the level of their capabilities, and how they are linked to supply/commodity teams. Also indicate what other Army functions/organizations participate in these activities.

1. Identification of purchasing needs
 - a. Materials specifications
 - b. Discussions/negotiations with requirements generators
2. Market/industry research/studies/analysis
 - a. Assessment and monitoring of supply environment
 - b. Assessment and monitoring of key supply cost drivers
3. Risk assessment
4. Supply strategy/strategic materials acquisition plan
 - a. Development
 - b. Documentation
 - c. Execution
 - i. Identification of suppliers
 1. Supplier qualification and selection teams
 - ii. Analysis of proposals
 - iii. Selection of suppliers
 - iv. Negotiations with suppliers
 - v. Establishment of partnering and strategic alliance agreements
 - vi. Issuance of purchase orders
 - vii. Monitoring and management of suppliers
 1. Quality
 2. Costs
 3. Delivery

- 4. Continuous improvement
- 5. Get-well plans
- 6. Administration of contracts
- viii. Development and maintenance of purchasing records

5. Make/repair versus buy decisions

6. Enterprise strategic planning

E. Activity time allocation

- 1. Materials management (studies)
- 2. Sourcing strategy and analysis
- 3. Supplier development
- 4. New product and process development
- 5. Other (delivery, training, e-mail, etc.)

Appendix B: Interview Findings on PSM Organizational Dimensions

Below we present the four tables that are a composite of the various PSM evolution models described in Chapter 3, which we used to develop our interview protocol, with the synthesis of our interviews in green font. Categories that could not easily be broken into three or five stages, such as goals and objectives, were summarized overall. The letters and numbers in red font correspond to the questions in the interview protocol in Appendix A.

Table B.1: Functional Attributes of the Organization

PSM GAP ANALYSIS					
FUNCTIONAL ATTRIBUTES	Status of Organization				
	1	2	3	4	5
Reporting level	Very low	Low	High	Very high	Top
A.3	Supply and contracting organizations report to the top within each LCMC, to a lower level within AMC, and to a lower level still within the Army.				
Organizational characterization	Support/ low value function	Price reduction	Cost reduction/ performance improvement	Strategic/ integral part of supply chain team	Supply as a competitive weapon
A.1 to A.19	Most were focused on performance improvements and price reductions				
People	Clerical focus	Cross-functionally trained	Basics of sourcing strategy	Develop creative sourcing strategies	Add value
A.10 A.11	The focus of personnel ranged from some clerical, to basic strategic sourcing, to some development of innovative sourcing strategies.				
Personnel education levels	High school	Some college	Bachelor's degree	Some graduate	Master's degree
A.7	Education levels vary within functions and across them. Some older personnel have high school educations, because they were not required, particularly for item managers, but their numbers are dwindling as they retire. New hires have a four year degree and some have prior military and/or master's degrees, particularly within contracting. A number of contracting personnel have earned or are earning their master's degrees while working. At one IMMC, over 50% of personnel have a master's degree. Some contracting personnel have PhDs.				
Goals and objectives	Most report supporting the warfighter with quality equipment in the shortest amount of time. Additional goals reported included: improve performance and reduce costs, improve stock availability, improve the readiness rate, reduce lead-times (e.g., minimize PALT), fill the requirement, and establishing flexible, long-term incentive based contracts (e.g., PBLs). Engineers report goals of making technical data current and in the right format. Some report success of projects/tasks/implementations, implementation of Cooperative Planning, Forecasting and Replenishment for all long-term contracts, improving commonality by looking across weapon systems.				
Measurement of progress	Metrics are published monthly and depend on the activity. AWCF funded measures include PALT and PLT. Foreign Military Sales (FMS) or PM funded measures include the speed to get on contract/delivered given the requirement/scope of work and deadline. Other measures of progress include equipment readiness rates, dollars saved, backorder rate or number outstanding,% and number of backorders satisfied,% stock availability,				
A.5					

PSM GAP ANALYSIS					
FUNCTIONAL ATTRIBUTES	Status of Organization				
	1	2	3	4	5
	number of items/NSNs and% dollars on long-term contract, dollars awarded to small business, dollars competed. Additional measures include: number not mission capable due to supply, age of PWDs delinquencies, and unpriced contractual actions.				
Span of thinking	Order	Contract	Business unit	Enterprise	End-to-end supply chain
A.15	The span of thinking tends to vary, with higher management levels doing more of the enterprise-wide and end-to-end supply chain thinking. Lower levels of contracting personnel are more likely to be focused on the contract, with some thinking LCMC-wide.				
Operation mode	Reactive/ crisis mode	Mechanical/ transaction driven		Proactive/ some commodity strategies	Strategic/ supply management
A.12	Perceptions of the operational mode varied across LCMCs and functions as well as management levels. Most say they aim to be proactive but estimate that they often spend from 10–20% to up to 60% of their time in reactive/crisis or firefighting mode. Some Engineering personnel felt they were primarily firefighting and reactive, while others said they were firefighting about 20% of the time.				
Nature of activities	Clerical	Mostly clerical	Half and half	Mostly strategy development	Strategy development
A.10	The balance of activities range from 10 to 50% clerical or mostly clerical to 50 to 90% mostly strategy development, to almost 90% strategy development. The distribution of activities varies depending on the individual's position and organization. For example, a Branch Chief's activities can be low clerical, high administrative, and medium analytical and strategic. Contracting personnel report a range of clerical and administrative activities from a low of 10% to a high of 40%, while some, such as those working on performance based logistics arrangements, say they spend 90% of their time doing analytical activities. Financial management personnel report a high amount of clerical and administrative activities, a medium amount of analytical activities, and a relatively low amount of strategic activities. Engineering personnel report a relatively low level of clerical and administrative activities, with most of their efforts focused on analytical and strategic activities. Item managers report that their activities are primarily analytic and strategic, with some clerical and administrative.				

PSM GAP ANALYSIS					
FUNCTIONAL ATTRIBUTES	Status of Organization				
	1	2	3	4	5
Information systems A.13	Poor data availability	Disjoint systems/ Islands of automation	Limited data integration/ process automation	Enterprise-wide data warehouse/ electronic commerce	Total cost modeling
	Personnel report that information is somewhat to mostly or highly integrated and that they are moving to more integration. Most report that it is semi-integrated. However, some information is still fairly compartmented and not all processes communicate, particularly with customers. In addition, new personnel do not understand what is behind the software. Perceptions of data quality vary from high to low depending on the system. Some data needs to be validated and cleansed. Most information needed exists, but it can be hard to find and challenging to figure out where to go to get it.				
Automation A.14	Paper	Transactions	Performance measurement	Communications	All non-value added activities
	The level of automation depends on where personnel reside in the organization and range from partial, mostly, highly, to almost totally automated. Contracting personnel report partial to almost total automation. Engineers also report that they are at the high end of automation.				
Internal focus A.16	Purchasing function	Functional customer	Sub unit/ MAJCOM	Business unit/ Service/Agency	Enterprise/ DoD
	The focus of the organization varies. Some report being focused enterprise-wide, while others are focused on the LCMC. Some say management thinks enterprise-wide, while lower levels think about getting the job done.				
External focus A.16	Weak customer		Customer		Strong customer
	Most report that they are externally focused on the customer. Some report that they try to be externally focused, but often end up being internally focused.				
Evaluation metrics A.5 A.19	Compliance, efficiency/ (e.g., # POs generated, \$s/buyer)	Functional price reductions/ purchase price variance	Internal process outcomes	Extend to supply base performance	Customer/ supply chain/ enterprise outcomes
	Interviewees expressed concern with some of their metrics because external factors beyond their control, such as the availability of funds, changes to supplier ownership, or technical data changes, affect them. Some report that they do not have any metrics other than to get the job done. Engineers report that they have organizational goals as well as quality. Others report that their metrics are based on their job description. Contracting personnel report regulatory compliance and statutory metrics, as well as Procurement Acquisition				

PSM GAP ANALYSIS					
FUNCTIONAL ATTRIBUTES	Status of Organization				
	1	2	3	4	5
	Lead Time (PALT), dollar value, and time in station goals. Item managers report fleet readiness, stock availability, and backorder metrics. Some report customer satisfaction (i.e., survey) metrics. Accomplishments and training were additional metrics reported. We were also given metrics for some organizations. There are not many metrics at the individual level.				
Strategy perspective	Local/short-term	Regional/ Divisional	National/ Business unit/medium-term	Global/ Enterprise	End-to-end supply chain/long-term
A.18	Strategy perspectives varied. Some report that, more recently, their perspective has been reactive/short-term. Forecasts are 3 years, and many report medium- to long-term perspective. Some are looking beyond the primary vendors to sub-vendors to the end-to-end supply chain. Item managers and engineers report that their focus is split about 60% short-term and 40% long-term. Contracting personnel report about 70% of their focus is on long-term and about 30% on short-term, with higher level personnel focusing even more on long-term.				
Coordination and control	Decentralized		Business unit/regional		Centralized/ center-led
A.20	There was fairly consistent agreement that they are center-led with centralized policy and planning and decentralized execution. Some feel they have a lot of flexibility and the freedom to implement and innovate. They are team-oriented and do a lot of coordination. Internal coordination is not a problem, but cross-organization can be problematic. Engineers and financial analysts felt they were more centralized.				
Standardization of policy practices and processes	Ad hoc /decentralized		Hybrid	Center-led	Centralized
A.21	Policies and procedures are centralized and some processes are very standard. Within LCMCs, they try to use standard processes, but processes vary across LCMCs. Item manager processes are largely standardized. Engineering feels about half of their processes are standardized and half are not. Some contracting processes are also very standardized. The goal of LMP is standardization, but there is concern that LMP will not fit TACOM and AMCOM processes.				
Functional cooperation/ integration	Silos/none	Little	Some	Extensive	Cross-functional teams
A.22	Cooperation, teaming, and integration were rated as very good to high to very high. Since going to cross-functional teams, they note that they collaborate a lot more than in the past.				

PSM GAP ANALYSIS					
FUNCTIONAL ATTRIBUTES	Status of Organization				
	1	2	3	4	5
Level of internal trust A.23	Low		Moderate		High
	The level of trust depends on the area and personality. Ratings ranged from moderate, to good, to high, to very high.				
Supply strategy development A.24.a	Decentralized at local level	Centralized at subunit, regional/ divisional	Centralized at enterprise	Centralized at enterprise/ supplier's spend included	Centralized at enterprise/ global assessment of markets
	Most reported that acquisition planning was centralized or highly centralized, which is the standard, but they may make exceptions. Acquisition planning is weapon system focus and they work with PMs. They are doing DoD-wide acquisition planning for a few weapons such as the HMMWV. Engineering and logistics report that they are decentralized, but it varies by PM.				
Supplier selection criteria A.25	Price		Price and performance	Some cost of ownership	Total cost of acquisition and ownership
	Supplier selection criteria can vary, depending on what is being purchased, the supply market, the buyer, and PCO experience. Technical requirements are usually the first criteria. If they have the data and the item is competitive, the competition advocate is involved and the criteria are often price and delivery (schedule), but suppliers have to prove that they are qualified to produce before they can bid. Other criteria can include risk and past performance. They generally take the small business advocate (SBA) recommendations, even when the supplier's past performance has been poor. Significant savings have been obtained from some reverse auctions for commodities purchased mainly based on price. If they have no technical data, which is often the case, the item is sole source and they negotiate a price. For new systems, Program Managers (PMs) use total cost of ownership and best value for supplier selection. Recently they have been doing some best value contracts which have shorter lead times and/or better delivery schedule. Performance Based Logistics (PBL) solicitations are based on a Business Case Analysis (BCA) and doing Total Cost of Ownership (TCO) competitions. They often use a directed source for Foreign Military Sales (FMS) purchases.				

PSM GAP ANALYSIS					
FUNCTIONAL ATTRIBUTES	Status of Organization				
	1	2	3	4	5
Supplier relationships	Short-term, adversarial, spot buys	Some long-term	Some strategic suppliers	Many preferred suppliers	Long-term, cooperative
A.27	They are migrating more and more to longer-term (e.g., 3-5 years) contracts. Parts for some weapons (e.g., HMMWV) are largely (up to about 90%) on long-term, Indefinite Delivery, Indefinite Quantity (IDIQ) contracts with a minimum order. All PBL contracts are long-term. Longer-term forecasts have enabled this. They typically use purchase orders (POs) for low requirement and uncertain demand parts. Thus, more of the dollars, but less of the contracts, are longer-term. Some OEMs are reluctant to write longer-term contracts because of resistance from their lower tier suppliers. The level of cooperation depends on the supplier. Most are cooperative. Some are very cooperative with an occasional adversarial relationship with certain suppliers.				
Management of the supply base	No effort/short-term		Some effort/medium-term		Considerable effort/long-term
A.26	Supply base management varies. There are not enough resources to manage the entire supply base and they have offloaded some supplier management to DCMA. They communicate with suppliers, but that has decreased because of OIF. Some feel they are limited in what they can do. Uneven budgets and erratic demand can make it difficult to manage the supply base. In some cases they try to build up the vendor base. They have paid sole source suppliers to facilitate capacity expansion. They have also tried to keep a warm production line by issuing contracts to keep the industrial base going. If they have the volume, they will sometimes split awards and dual source to increase capacity. In some cases they are trying to be more proactive and provide incentives to OEMs to manage their supply base (e.g., strategic metals). They are also interacting with some lower tier suppliers and have created tools that will allow sub-vendors to see forecasts. One LCMC invites its top suppliers to biannual meetings with the CG, which are focused on supply chain issues and what suppliers and LCMC can do better. They also attend other industry days, such as those hosted by DLA. If they get no bids, they will go to good suppliers and ask them what is wrong with the offer. Sometimes they will group components together on a contract to ensure that they fit together.				
View of suppliers	Adversary		Resource		Strategic resource
A.28	The view of suppliers depends on the item/commodity and supplier. They are shifting toward partner and strategic resource where they can. Long-term contracts are a sign of a partner.				

PSM GAP ANALYSIS					
FUNCTIONAL ATTRIBUTES	Status of Organization				
	1	2	3	4	5
Level of external trust A.29	Low		Moderate		High
	The level of trust varies. Most supplier relationships are moderate trust, with some low and some high trust. In general the level of trust and partnering is higher with more established suppliers and moderate with newer suppliers. They have moderate to high trust relationships with most OEMs, but they don't know much about the rest of suppliers, particularly small businesses. Some suppliers will not make material before they see a contract, whereas others will.				
Resource availability A.8	Low		Moderate		High
	Perceptions of the availability of resources, from low, to moderate, to high. Availability of funds also varies over the year, with the last quarter particularly lean. They do not always have the budget to make required obligations. Personnel availability is perceived to be low due to more missions with the same or less personnel. Personnel can't find the time for training or mentoring. Due to retirements, they have had to hire a lot of interns, but experienced personnel either are not there to train and mentor them or are too busy to do so, which reduces the availability and quality of on-the-job training. Funds for travel are particularly lean, as are funds for new initiatives and team building, and when travel funds are available, they may be told they can't travel. For example, for Source Approval Request (SAR) parts they are mandated by law to visit the source every three years, but they are unable to accomplish this due to manpower and funds availability. They also do not have the resources to follow up on quality problems. They don't have the resources to be proactive in trying to develop new sources. They used to train suppliers once a year on partnership and periodically met with suppliers in a region when they were on the road. For example, they would learn that the supplier is exiting the business.				
Training and education A.9	Little, poor quality		Some, good quality		Extensive, high quality
	While there is strong leadership support for and a high focus on training, it is limited by the availability of funds, time, and courses as well as the quality of some courses and the availability of experienced personnel to teach. The Defense Acquisition University (DAU) has courses that are very good and relevant, but some of the mandatory training courses required for Level 1, 2, and 3 certifications are offered infrequently and workload can get in the way of attendance, which makes some mandatory certifications difficult to obtain. They report that DAU online training courses are not that relevant and do not work well because of interruptions. DAU residency provides much better training, since the quality of some of the courses taught by contractors was particularly poor. Courses tend to be functionally focused and do not provide much training across functions. Courses are also not very forward thinking. Training in industry practices is also lacking. Some training is not that pertinent to what they need to do. They have a lot of interns who require both formal and on-the-job				

PSM GAP ANALYSIS					
FUNCTIONAL ATTRIBUTES	Status of Organization				
	1	2	3	4	5
	training (OJT). Interns are getting the formal training, but not all of it is relevant to the job, which often has to be learned through OJT. A number of respondents felt that there needs to be more mentoring. Item managers used to be assigned mentors, but now those who have the knowledge do not have the time to train interns. To the extent that training is high, it is often through special efforts. There are some perceptions that intern courses are good, but advanced training is not as good. Contracting specialists perceive their training to be fairly high. Some LCMCs have developed their own internal training.				
Internal power of purchasing	Low		Medium		High
A.30	Perceptions of internal power vary, from low,, to moderate to high. Program Managers have the dollar/resources but not necessarily the power. Power also varies, depending on the commodity. If it is a readiness driver, there is more power, if not, there is less. Supply has fewer resources and less power. Contracting has some level of power/freedom to execute, but does not have the resources/dollars. Reporting to a supportive, very high level helps with internal power.				
External power of purchasing	Low		Medium		High
A.31	The external level of power depends on the weapon system, commodity, total spend, and relative size of the business. If the item is sole source because they did buy the drawings, external power is low. Big OEMs care about the amount of business they can get. Thus, when the business is a small share of the OEM's total business, power can be low to moderate.				

NOTE: Text in **red** denotes questions in the interview protocol in Appendix A to which the answers correspond.

Table B.2
Frequency of Occurrence of PSM Related Activities

PSM Gap Analysis						
ACTIVITIES: Purchasing and supply management	N/A 0	Never 1	2	Sometimes 3	4	Often 5
Identification of purchasing needs (requirements) D.1						IM
Discussions with requirements generators D.1.b				X		
Involvement with materials specifications D.1.a				Engr.		
Identification of suppliers D.4.c.i					Engr.	
Market studies D.2			Q			
Market research (rigorous) D.2.b		AQ				
Monitoring of supply environment D.2.a				DCMA		
Development of supply strategy/ strategic materials acquisition plans (written) D.4			X			
Analysis of proposals D.4.c.ii						Engr./ PRAG
Selection of suppliers D.4.c.iii						AQ
Supplier qualification and selection teams D.4.c.i.1					Engr.	
Negotiations D.4.c.iv						AQ
Establishment of partnering and strategic alliances D.4.c.v			X			
Issuance of purchase orders D.4.c.vi						AQ
Administration of contracts D.4.c.vii.6						DCMA
Purchasing records D.4.C.viii						AQ

Table B.2—continued

PSM Gap Analysis						
ACTIVITIES: Purchasing and supply management	N/A 0	Never 1	2	Sometimes 3	4	Often 5
Management of supplier quality (with contract) D.4.c.vii.1				DCMA		
Purchase of inbound transportation N/A *	X					
Monitoring of supplier continuous improvement D.4.C.vii.4		X				
Management of investment recovery N/A *	X					
Participation in enterprise strategic planning D.6	X					
Participation in make versus buy decisions (comp.) D.5			IM			

* No direct link to interview protocol.

NOTES: Text in **red** denotes questions in the interview protocol in Appendix A to which the answers correspond.

Many of our interviews were with multi-functional groups. Acronyms and abbreviations other than an X refer to organizations primarily responsible for the specific activity. Sometimes, as in the case of the Defense Contract Management Agency (DCMA), the activity is performed by another organization, not just a specific function such as item manager (IM), engineering (Engr.) or acquisition (AQ).

Program Risk Analysis Group (PRAG) for risk assessments greater than \$10 million.

Table B.3
Frequency of Occurrence of Use of PSM Practices

PSM Gap Analysis					
PRACTICES: Purchasing and supply management	Never	Seldom	Some-times	Often	Always
Cross-functional sourcing teams C.1.a				X	
Cross-unit sourcing teams C.1.b		X			
Enterprise-wide sourcing teams C.1.c		X			
Spend analysis C.2.a		X			
Rigorous market analysis (depth/breadth) C.2.c		X (market survey)			
Rigorous total cost of ownership analysis (others do) C.2.e.iv		X			
Written, proactive supply strategy C.3.a, C.3.b, C.3.c		X			
Supply strategy linked to enterprise strategy C.3.d, C.3.e, C.3.g		X			
Consolidation of sole source contracts C.5.b.i			X		
Aggregation of related requirements C.5.a.i			X		
Volume leveraging C.5.a.i			X		
Supply base rationalization C.5.a.ii		X			
Longer-term key supplier relationships C.5.a.iii				X	
Strategic supplier partnerships/alliances C.7.f			X		
Supplier development (cost, quality, delivery, lead time) C.10			X^a		
Early Purchasing Involvement (EPI) in new product development C.4.a			PEO		

Table B.3—continued

PSM Gap Analysis					
PRACTICES: Purchasing and supply management	Never	Seldom	Some-times	Often	Always
Early Supplier Involvement (ESI) in new product development C.7, C.8			PEO		
Material/service standardization C.4.b			PEO/ Engr.		
Measures and tracks supplier performance/improvement C.5.d.ii				DCMA/ PPIMS^b	
Establish Supplier Councils C.9.f	X				
Develop preferred supplier program C.7.d	X				
Leverage supplier capabilities (e.g., technology) C.7.h		X			
Monitor supply environment C.5.d.i		X	DCMA		
Establish long-term supplier relationships for service parts before initial product production starts C.7.e	PEO				
Share technology roadmaps with key suppliers C.8.a.vi	PEO				
Share plans with key suppliers C.8.a.i	PEO				
Share long-term forecasts with suppliers C.8.a.i		X			
Share short-term forecasts with suppliers C.8.a.iii			X		
Share real-time demand data with suppliers C.8.a.v	X				
Share demand history with suppliers C.8.a.ii			X		
Level buying for suppliers (IDIQ) C.5.c.i			X		

NOTE: Text in **red** denotes questions in the interview protocol in Appendix A.

^aFor small and 8(a) businesses.

^bPPIMS = Past Performance Information Management System.

Table B.4
Allocation of Time Among Different Purchasing Activities

PSM Gap Analysis					
A.11.a, b, c, d, e, f E.1, E.2, E.3, E.4, E.5 ACTIVITIES	Percent Time Allocation of Purchasing and Supply Management Function				
	AQ		IMs	Engrs.	PM
	SFL	PB			
Transactional buying	30-95	10	25-30		
Materials management (studies)			60-100	5-10	
Sourcing strategy and analysis	5-50	90	10-15	30-50	10
Supplier development	10 (SB)			30-50	5
New product and process development				10	50
Other (delivery, training, e-mail, etc.)					40

NOTE: Text in **red** denotes questions in the interview protocol in Appendix A.

Strengths: Teaming, communication, leadership, customer support, partnering and collaborating with contractors, negotiations, working together, level of expertise, high ethics, continuous learning.

Major PSM-related initiatives: Lean Six Sigma, LMP, BRAC, PBL, SCOR.

Appendix C:

Data Tables for Time Series Analyses

Most LCMC Contracts Are Short-Term and For a Small Percent of Total Spend

FY	LCMC ¹ total			# Ctrx ≥ 5 years	Percent ≥ 5 yr		Percent < 2 yr	
	# Ctrx ²	\$s M	# suppliers		Ctrx	\$s	Ctrx	\$s
1995	4,297	8,948	1,616		11.2	26.5	58.5	27.2
1996	4,880	10,460	1,849		7.5	17.6	68.4	32.1
1997	5,139	11,588	1,964		7.2	22.1	70.3	35.9
1998	5,311	12,385	1,957		6.6	23.8	65.4	34.4
1999	5,935	13,727	2,358		6.0	29.4	69.1	33.2
2000	6,354	15,930	2,375		6.5	28.1	71.1	36.3
2001	6,577	17,962	2,525		7.6	33.7	69.8	31.1
2002	7,078	19,948	2,744		9.8	31.2	68.5	34.2
2003	8,380	23,680	3,046		13.0	32.8	64.6	31.8
2004	9,717	30,084	3,618		12.0	32.4	66.4	33.8
2005	11,206	39,925	3,863		12.3	32.6	65.7	35.5
2006	10,248	41,015	3,752		11.8	37.3	65.5	30.2
2007	10,281	53,431	3,933		15.2	33.4	64.2	36.2
2008	10,034	70,698	3,912		14.9	33.9	65.6	40.5
2009	8,967	61,401	3,714		11.0	34.0	72.2	37.4
2010	7,729	54,801	3,306		9.6	28.7	73.6	36.6

¹AMCOM, CECOM, TACOM ² Written and used

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Source: FY 1995-2006 DD350 data.

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**Average Contracts Per Supplier Has Gone Up and
Dollars Per Contract Has Gone Down**

FY	LCMC ¹ total			Ctrx/supplier		\$s M/supplier		\$s M/ctrx	
	# Ctrx ²	\$s M	# suppliers	Avg	Max	Avg	Max	Avg	Max
1995	4,297	8,948	1,616	2.7		5.5		2.1	
1996	4,880	10,460	1,849	2.6		5.7		2.1	
1997	5,139	11,588	1,964	2.6		5.9		2.3	
1998	5,311	12,385	1,957	2.7		6.3		2.3	
1999	5,935	13,727	2,358	2.5		5.8		2.3	
2000	6,354	15,930	2,375	2.7		6.7		2.5	
2001	6,577	17,962	2,525	2.6		7.1		2.7	
2002	7,078	19,948	2,744	2.6		7.3		2.8	
2003	8,380	23,680	3,046	2.8		7.8		2.8	
2004	9,717	30,084	3,618	2.7		8.3		3.1	
2005	11,206	39,925	3,863	2.9		10.3		3.6	
2006	10,248	41,015	3,752	2.7		10.9		4.0	
2007	10,281	53,431	3,933	2.6		13.6		5.2	
2008	10,034	70,698	3,912	2.6		18.1		7.0	
2009	8,967	61,401	3,714	2.4		16.5		6.8	
2010	7,729	54,801	3,306	2.3		16.6		7.1	

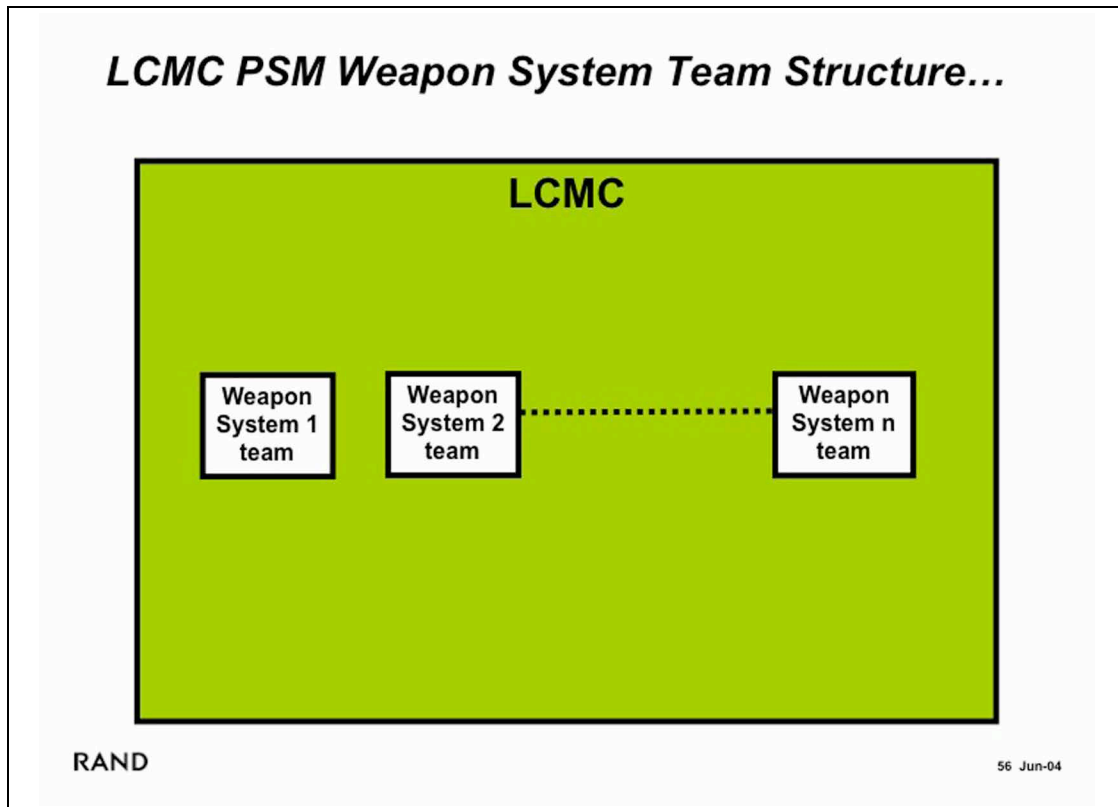
¹AMCOM, CECOM, TACOM ² Written and used

RAND

Source: FY 1995-2006 DD350 data.

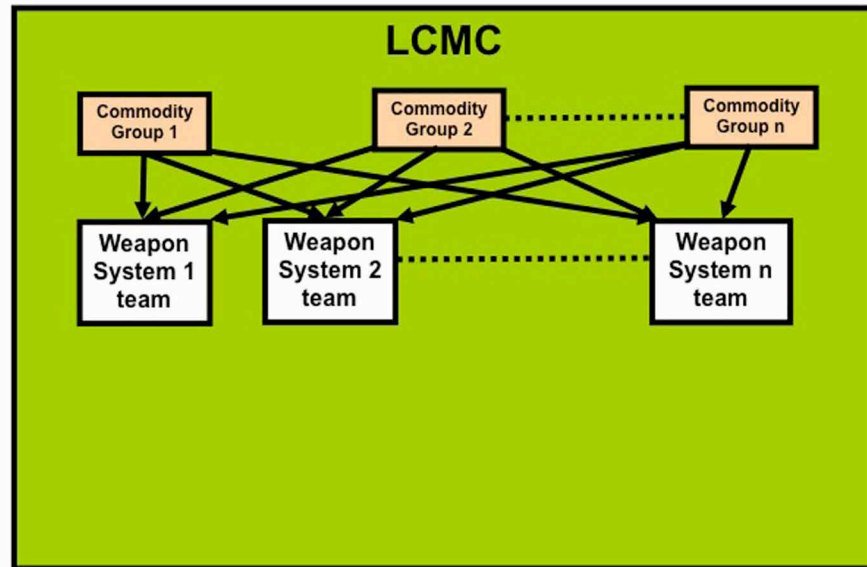
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Appendix D: Example of LCMC Organizational Structures and How They Can Impede Best PSM Practices



This appendix illustrates challenges that LCMCs have in implementing best purchasing and supply management practices. As indicated above, each weapon system currently has its own team.

***...Can Impede Commodity Group Management When
Commodities Cross Weapon Systems...***

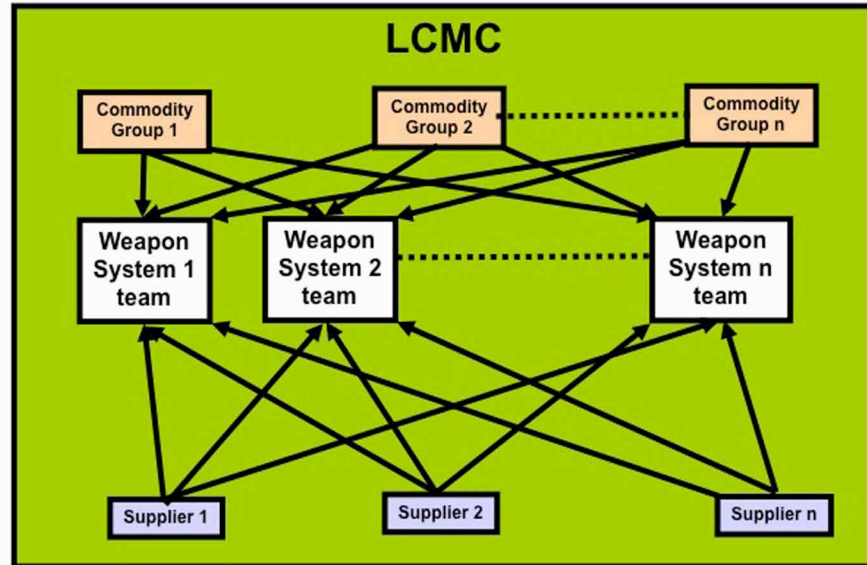


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When a category or commodity group crosses weapon systems, such as it does for tires and track, effective management requires the establishment of a commodity team that crosses all weapon systems with the same or similar commodities. Otherwise, category group management is impeded.

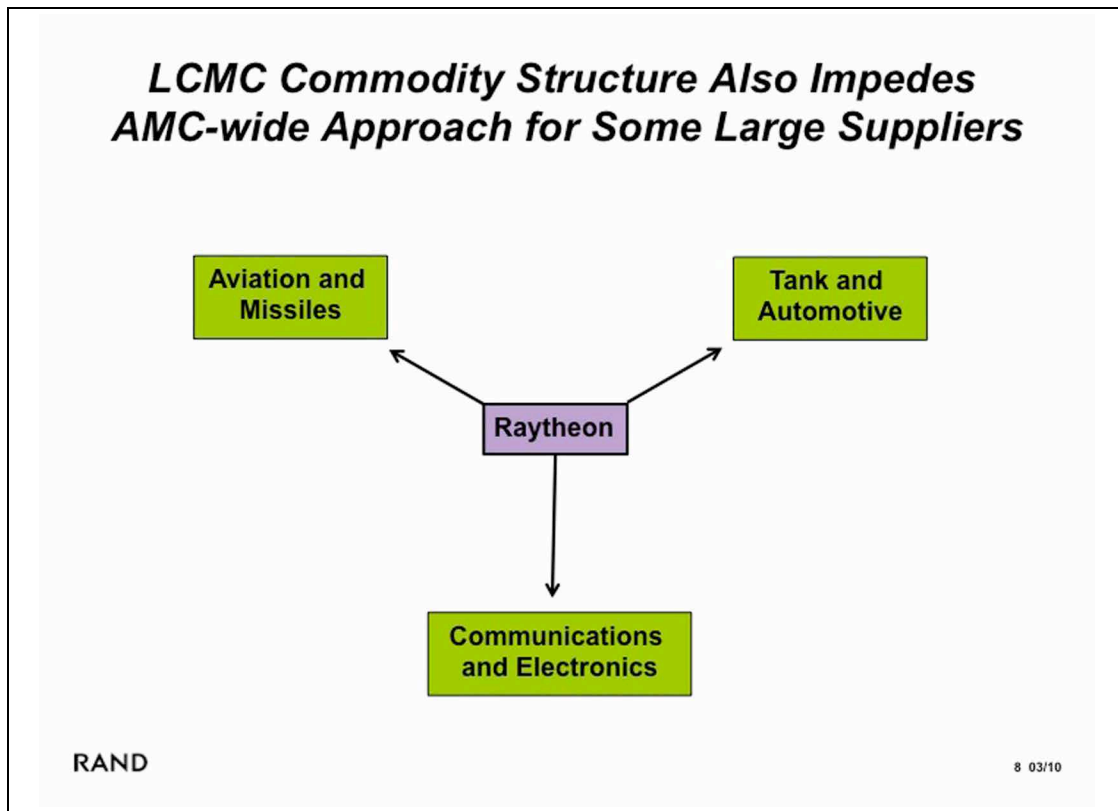
***...As Well as Supplier Relationship Management
When Suppliers Cross Weapon Systems***



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Similarly, when suppliers cross weapon systems, the current weapon system structure can impede SRM. Separate SRM teams are required for large Original Equipment Manufacturers (OEMs) that supply multiple weapons to the Army.



Lastly, the AMC LCMC commodity structure can impede effective SRM for large suppliers that provide goods and services across LCMCs. For example, from FY 2003 to FY 2006, Raytheon had a total of 673 contracts for a total of \$7,406 million with AMCOM, CECOM, and TACOM. AMCOM accounted for most of these sales, including 54 percent of the dollars and 63 percent of the contracts. CECOM accounted for 26 percent of the contracts and 37 percent of the dollars, and TACOM accounted for 10 percent of the dollars and 12 percent of the contracts.

In organizing for purchasing and supply management, the LCMCs must be aware that their organizational structures can pose impediments. They need to organize, as much as possible, by commodities, particularly for competitive goods and services, as well as by supplier for sole-source goods and services. They can also use information systems to aggregate future similar requirements across weapon systems and organizations as well as sole-source contracts across

suppliers. Finally, they can benefit by linking sustainment to acquisition, when purchasing leverage for sustainment items is greatest.

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